

PACIFIC RADIO NEWS

*Pioneer Journal of
Western Radio News and Development.*

"best I ever tried"---

THE A-P VT AMPLIFIER- OSCILLATOR

—the amplifier used by the U. S. Navy. "Use the tube the Navy uses."

Price \$7.

THE A-P ELECTRON RELAY

—the most sensitive detector of spark signals known to the radio art.

Price \$6.

THE A-P TRANSMITTER TUBE

—an efficient undamped wave transmitter for use in radio-telephony.

Price \$7.50.

A-P Tubes are licensed by the Radio Corporation of America under the DeForest Audion and Fleming patents for amateur and experimental use in Radio communication.

Order from your dealer or write direct.

"The last vacuum tube you gave me I find that it works the best I ever tried, it also oscillates fine, and sure can hear C.W. and spark stations loud and clear. The filament works around 3 3/4 volts."—Signed Stephen F. Pitoniak, 12 Valley Rd., Albion Pl., April 25, 1921.

Use A. P. Tubes and you will be equally enthusiastic. Use A. P. Tubes for efficiency, use A. P. Tubes for sure results, use A. P. Tubes for better results. There is an A. P. Tube for every purpose. Use *only* A. P. Tubes.

And for the best book on Radio, ask your dealer for "*Elements of Radiotelegraphy*," by Lieut. Ellery W. Stone, U. S. N., or order direct from—

The Atlantic Radio Supplies Co., 8 Kirk Place, Newark, N.J.
The Pacific Radio Supplies Co., 638 Mission St., S. F., Cal.

Distributors for Moorhead Laboratories, Inc.

use A-P tubes for efficiency

TKG540
R17

Nationally known since 1915.
General Electric Quality Plus
Cunningham Service.

The trade-mark GE is the
guarantee of these quality
tubes. Each tube is built to
most rigid specifications.

Why the Amateur chooses Cunningham Tubes

CUNNINGHAM Detector Tube Type C-300 functions as a highly sensitive detector of spark radiation, a tone frequency amplifier and an oscillator for regenerative amplification and C.W. reception; also as a radio-phone detector and amplifier. It possesses these combination properties to a greater degree with the added advantages of low B battery and quietness in operation.

It possesses almost perfect uniformity in plate voltage, signal audibility and sensitiveness, sustained throughout the operating life, plus all the operating properties of the Ideal Amateur Tube. The mechanical

assembly is entirely by machine, further assisting in uniformity of operation and appearance.

The customary hissing or "bubbling" has been practically eliminated in Type C-300, resulting in extreme quietness in operation, and a completely silent telephone receiver in the absence of incoming signals. This permits the reading of faint signals and exact adjustment for maximum sensitiveness.

The Amateur realizes that in Cunningham Tubes he has all that five years of service and General Electric Quality can mean to the Radio Field.

Dealers: Standard Packages F. O. B. Cleveland, San Francisco,
New York. Broken Packages F. O. B. San Francisco.

35 Montgomery Street

Trading as Audiotron Mfg. Company
Since 1915

San Francisco, Calif.

SACO CLAD

Announcing the
100% SHIELDED TRANSFORMER



SIX STAGES AUDIO FREQUENCY —THE BANDMASTER SAID "STOP!"

A week ago a stranger walked into our offices. He was soon talking about Saco Clad transformers and, without a word of exaggeration, here is what he said:

"... and during a recent municipal demonstration with our Six Stage Saco Clad Amplifier, the amplification was so great that our radiophone music interfered with the local band and could be heard $\frac{1}{4}$ of a mile thru the hubbub of the city's noises. . . ."

Another letter from a disinterested dealer says:

"... We have tried practically every make of transformer and believe that Saco Clad is by far the best transformer of them all. . . ."

If you study the cross section at the left, you will see the reason for these commendations.

A Summer Necessity—Saco Clads and Vocalouds

Saco Clad amplification pulls a Vocaloud (advertised last month) means you can carry on your radio activities in comfort during the hottest Summer days—just sit back and listen to loud, clear signals and radio phone concerts from the Vocaloud—no head phones or straining for weak signals. And of course, any number of friends can listen with you.

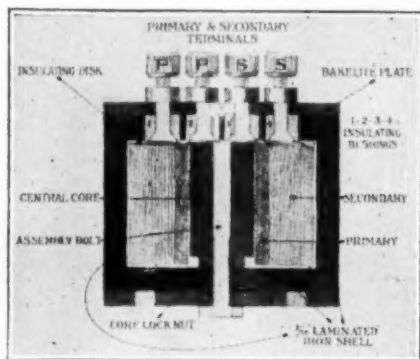
This combination is economical. The Saco Clad Transformer is only \$5.00; after July 15th the Laboratory Type Vocaloud will be \$25.00 and the station type \$30.00.

If your dealer hasn't these instruments in stock, it is easier for him to sell you something else—but you should demand that he obtain them. Then make every possible comparison.

DEALERS: We have a new loose leaf catalogue for radio dealers. A charge of \$.25 is made to all except dealers. Amateurs should go to their radio dealer and ask to see this catalogue.

NOTE: Ask your dealer to show you the Firco Audion Units. They are made in two units—Standard and Midget—and are absolutely the best buy on the market.

John Firth & Company, Inc., 18 Broadway, New York



The 3-16" continuous shell of laminated silicon steel serves three purposes.

(1) A perfect path for the magnetic flux.

(2) A 100 percent magnetic shield—eliminates howling on even six stages and diminishes tube noises.

(3) It is literally impossible to damage a Saco Clad by physical forces.

No other transformer at any price has such outstanding features.

Don't accept substitutes. Demand the Firco Saco Clad put up in separate cartons bearing the Firco Trade Mark.



FIRCO Audion Detectors
and Amplifiers
Radio Frequency Amplifiers
High Voltage Units
(with any primary voltage)

Baldwin Phones

Firco Vocaloud

Saco-Clad Transformer

Firco Accessories

Kolster Decrometer

United States Bureau
of Standards Wavemeter

Eldredge Meters

(individually calibrated)

Brownlie Phones

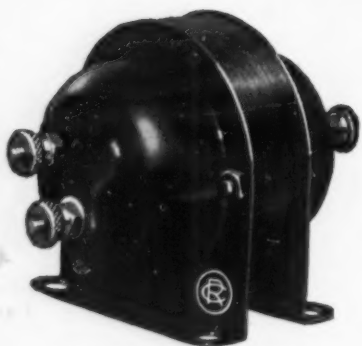
(adjustable)

FIRCO RADIO

EQUIPMENT

"Pioneers—since 1901"

For Receiving Circuits



Amplifying Transformer

Model U. V. 712

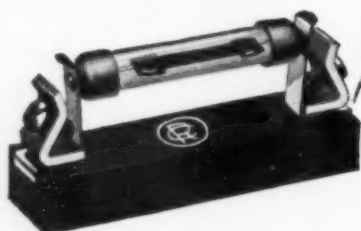
Price, \$7.00

A new inter-tube tone-frequency amplifying transformer designed to make Radiotron Detector, U. V. 200 and Radiotron Amplifier Tube, U. V. 201, the most effective vacuum tubes on the market today. Tests have proved this conclusively.

Special bulletin containing detailed data and circuit diagrams for the use of U. V. 712 will be sent upon request.

These Standard Grid Leaks are in use everywhere in radio circles, from the largest laboratory to the most humble amateur station. They are of rugged construction, and of uniform and constant resistance. These Standard Grid Leaks are an absolute necessity for stabilizing the operation of vacuum tube detectors and amplifiers.

Write for our Grid Leak Bulletin. It explains the use of Grid Leaks in radio-receiving circuits.



Standard Grid Leak

Complete, \$1.25

Mounting only, \$.50. Units any value from .15 to 6. megohms, \$.75

AMATEURS

The four accessories here illustrated are made according to the same high standards set for Radiotron Vacuum Tubes — now famous throughout the amateur field.



"A"

Battery Potentiometer

Model P. R. 536

Price, \$2.00

Close variation of the plate voltage of detector tube, Radiotron U. V. 200 often means the reception of otherwise unreadable signals from great distances. Using our Potentiometer, Model P. R. 536, you can really locate the most sensitive point on the characteristic curve. This potentiometer is unusually well built and superior to those heretofore supplied to the trade.

Thousands of these sockets are now in use throughout the amateur field. They will fit the Radiotrons U. V. 200, 201, and 202, insuring reliable contact under all operating conditions. Moulded unit made to fit and last, and backed by the R C stamp of quality.

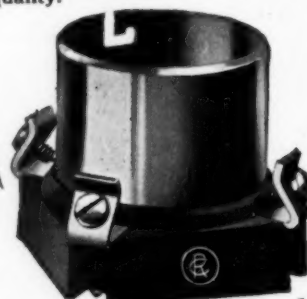
IMPORTANT

A full line of apparatus for C. W. transmission is now in process of manufacture and will be available September 1.

DEALERS

Here is an unusual opportunity to handle the products of the greatest organization of its kind. Be one of the first to profit by this line.

Write Today



Standard Bakelite Socket

for Radiotrons U. V. 200, U. V. 201, U. V. 202

Price, \$1.50

Radio  **Corporation**
of America

Sales Division, Commercial Department, Suite 1804
233 Broadway, New York City

Consider your battery:

EVEREADY

The best wireless B battery is none too good for you.

Unusual results in range and clearness are being secured by the users of Eveready wireless batteries, because they are built especially for radio uses and with a full knowledge of radio requirements.

Eveready wireless batteries are made by the world's largest manufacturers of dry cell batteries and are members of a family holding a long and honored record of achievement.

The Eveready label is a guarantee of a superior battery—and results.

For sale by electrical dealers everywhere.

National Carbon Company, Inc.

599 EIGHTH ST., SAN FRANCISCO, CAL.



No. 774

Number 774 B Battery is made up of 27 cells connected in series. The wooden case containing this battery is impregnated with melted paraffine and solidly packed and sealed in paraffine with a half-inch of sealing wax added after the cells are in place, making of the whole a unit impervious to moisture. One negative and six positive terminals have heavy brass screws and nuts. This battery allows a range of 18 to 43 volts in steps of $4\frac{1}{2}$ volts. Dimensions over all, 9 inches by $3\frac{1}{8}$ inches by $3\frac{1}{8}$ inches deep. Price \$5.00.



The RADIO MAGNAVOX

NOW TAKES ONLY ONE AMPERE IN THE FIELD

The Radio Magnavox will reproduce signals louder than any other type of receiver. The force acting on the diaphragm of an electro-dynamic receiver is the product of the magnetic field strength (H), the length of the conductor (L) in the influence of the field, and the strength of the current flowing through the conductor (I). I in radio is the incoming signal * * * We make L and H very large, and as the formula is $L \times H \times I = F$, it is obvious that if L and H are constant and I is the varying factor, then F will vary with I. Therefore if L and H are made large factors, F may become comparatively large even when I is very weak.

THAT IS THE SECRET OF THE RADIO MAGNAVOX

You cannot afford to be without one at your station especially at the very low price of \$45 from your dealer. See him at once.

The Magnavox Company

OAKLAND, CAL.

214 PENN. TERMINAL BLDG.,
NEW YORK CITY.

KENNEDY
EQUIPMENT

ANNOUNCING

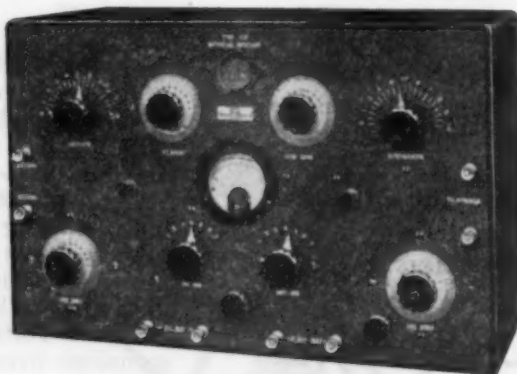
THE NEW KENNEDY UNIVERSAL REGENERATIVE RECEIVER

Type 110

EFFECTIVE RANGE: 175 to 25,000 METERS

DETECTS
REGENERATES
OSCILLATES

on all wave lengths
in common use



Licensed
under Armstrong
U. S. Patent
No. 1,113,149

SURPASSING even our highest hopes when we undertook its development, this latest addition to the Kennedy line is **of interest to everyone who uses a radio receiving set.**

OUR engineering staff spent many months in developing this unit and released it for production only when its performance surpassed every requirement we had set for it. By our long specialization in receiving equipment we have built up a reputation which is so valuable to us that we can afford to put the Kennedy trade-mark on only the highest quality product.

WE have spared no effort to make this the best receiver on the market. **We honestly believe that it is.**

These are some of its features:

- Variable inductive coupling between primary and secondary.
- Extremely sharp tuning because of very efficient inductance units.
- Special Kennedy bank-wound moisture-proof inductors.
- Generous overlap between inductance steps.
- Large balanced primary and secondary variable condensers.
- Micrometer adjustment of secondary condenser.
- Variable grid condenser with air dielectric, permitting most effective use of all types of available receiving tubes.
- Adjustable feed-back circuit.
- Fine adjustment of plate voltage by means of potentiometer connected between terminals of filament battery.
- Weston ammeter for measuring filament current.
- Bus-bar type insulated wiring.

Further details in Bulletin 101, mailed on request.

ASK your dealer for a demonstration. Compare the performance of this receiver with any other you have ever seen.

The users of Kennedy Equipment are our best advertisers.

THE COLIN B. KENNEDY COMPANY

INCORPORATED

RIALTO BUILDING

SAN FRANCISCO



PACIFIC RADIO NEWS





PAUL R. FENNER
Editor

LAWRENCE MOTT
Assoc. Editor

H. W. DICKOW
Advertising Manager
50 Main St., S. F., Cal.
Sept. issue forms
close on Aug. 1st

RADIOTORIAL

By LAWRENCE MOTT, Associate Editor

PUBLISHED MONTHLY

Subscription Rate
\$2.00 per year in
the U. S.
\$2.50 in Foreign
Countries

Copyright, 1921
Pacific Radio Pub. Co.

“VOLUME THREE, NUMBER ONE”

TO THEM that make our existence possible, i. e.: our advertisers, our subscribers and our contributors:

GREETINGS!

With this number of “Pacific Radio News” begins our third year in the field of radio publications, and it is entirely thanks to you **all** that we have grown from our erstwhile smaller form to our somewhat large and more dignified stature!

We deeply appreciate the loyal support that we have received from you **all**!

We are happily cognizant of your assistance in so many ways!

And we are indeed grateful!

In return for the recognition that we have received we have endeavored to make the publication both interesting and palatable—in short, **worth your while!**

We do not wish to err on the side of wearying frankness—hence we go not into a treasurer’s report of increase of circulation, and of advertising space. Were we so to do we might be thought to be lustily tooting our own horn—that we have no least intent of doing, as “PRN” does its own tooting!

We think, however, that we should—very respectfully—point out that this publication is the **ONLY** one that is not, in some way, more or less intimately connected with the trade in radio manufactures! Mind you, we do not intend to cast reflections upon any contemporary who is so connected. We are merely desirous that **you** should thoroughly understand our position—which is, in very brief:

To aid in the development of amateur radio.

To further its organization and success in all ways, and

To give due publicity to such apparatus—and results attendant upon their use—as seems to us to be normal and just.

We “play no favorites,” and what “tho” we have joyfully received a great many letters that are most flattering to our efforts with the publication—it will have doubtless been noted that we have never given one the light o’ day in our pages—preferring that our work stand upon its **own merits**—much as an all-round **man** stands upon his own two

feet, without seeking something to lean against—or upon!

We have tried to keep our pages clean of bogus and fraudulent matter—thus protecting the advertiser as well as the reader. We have sought to make our reading pages of a real value to the amateur—from the veriest tyro, to him who is far along the radio way. We have endeavored to eschew the dry-as-dust, and our generous contributors have gone to much trouble in order that the **beginner** might “get the idea” without becoming involved in too many technicalities—at first.

* * * * *

You have seen for yourselves our growth in the passed three years.

Our future lies—as must that of all publications—in the hands of our friends.

To these—and to them that we hope to make such—we express our earnest intent to keep “PRN” on a high level of radio interest, and up-to-the-minute with the latest information with regard to new apparatus, legal matters appertaining unto radio, and in touch with all things of general interest to the would-be amateur, the amateur and the super-amateur!

Selah!

FIVE DAYS LATER

EFFECTIVE with the current issue, “Pacific Radio News” will be ready for distribution on the 25th of the month instead of the 20th, as has heretofore been the custom. The September number, therefore, will be ready for the mails on August 25th and should be in the hands of every Western subscriber no later than the 28th of the month. Eastern subscribers and those

who purchase the publication from news dealers will receive their copies on the first or second day of the month. The closing date for advertising and editorial forms remains unchanged. All material for publication in the September number should be in our hands no later than the first of August. With the new distribution date set for the 25th of the month the publication will be on sale practically throughout the

entire month bearing the date of the issue.

Subscribers who do not receive their copies on the dates mentioned above should notify us at once. All changes of address should be filed with the post office as well as with the publishers, as several dozen copies of the previous issues have been returned, due to neglect on the part of the subscriber in notifying both parties of the change.

New York Office.....147 Sixth Ave.
Boston Office.....18 Boylston St.

Portland Office.....420 Bd. of Trade Bldg.
Chicago Office.....1306 Hartford Bldg.

Seattle Office.....419 Pioneer Bldg.
London Office....62 and 8a, The Mall, Ealing

Entered as second class matter January 22, 1920, at the Post Office at San Francisco, Cal., under the Act of March 3, 1879.

IN Article III it was stated that a method for printing radio telegraphic signals by means of an ordinary Morse recorder would be described.

Let us consider the characteristics of a so-called "soft" or detectortube. See Fig. 2. It will be noticed from this curve that it takes only a small negative grid voltage to reduce the plate current to almost zero. In practice it will be found that six to eight volts negative on the grid is sufficient to practically stop the plate current. Because of the steepness of the characteristic curve, if the plate current has been nearly stopped by a negative grid voltage, it will take a very slight positive voltage on the grid to cause a considerable plate current to flow. This is the property of a "soft" tube which makes it suitable for a controlling device for a relay. See Fig. 12 for

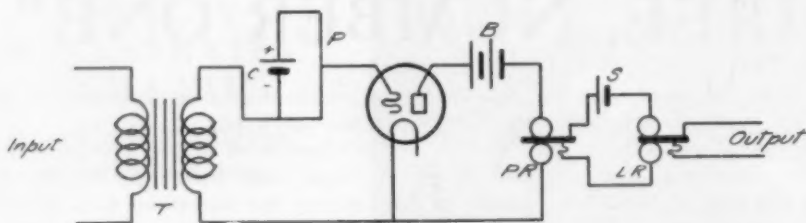


Fig. 12

connections. Hence, if in the circuit shown we make the grid sufficiently negative so that the polarized relay in the plate circuit will just cease to act, as soon as a very small a. c. emf. is impressed on the grid (an incoming radio signal), the positive halves of the a. m. grid voltage will reduce the negative charge on the grid sufficiently to allow a small plate current to flow. This change in plate current will be amply sufficient to operate the polarized relay. This arrangement has been actually used and works satisfactorily on loud signals, hence for good results one should have at least two or three steps audio frequency amplification preceding the "relay" tube.

The following points should be observed for best operation:

1. The "relay" tube should be a so-called "soft" or gaseous tube.
2. The "relay" tube should have its own plate battery, usually about 22.5 volts, so as to avoid interference from other circuits.
3. The grid battery should be about ten volts and should be provided with a smooth acting continuously adjustable potentiometer (not step by step) of at least 5000 ohms, so as not to unduly run down the battery. A graphite ord will not do, as the contacts on it are far too unsteady.
4. The polarized relay should be a high grade one of at least 10,000 ohms resistance. The relay must be connected properly in the circuit or it will not work, the binding post, as always, provided with polarized marks.
5. The extra relay should be an ordinary telegraph relay having about 500 ohms resistance. A condenser of about one-half of one microfarad capacity should be connected across the contacts of the polarized relay to eliminate sparking as much as possible. The object of the extra relay and of the condenser are to protect the contacts

of the polarized relay. The battery operating this second relay should be as small as possible, but still of sufficient size to insure positive action of the extra relay.

6. The method of adjusting the circuit in Fig. 12 is as follows: Open the grid circuit and with the filament burning and plate battery connected, adjust relay. Contact so that the relay will just contact firmly as indicated by the Morse recorder, then close the grid circuit, starting with zero grid make the grid just sufficiently negative to cause the relay to release. The circuit is then ready for operation.

At this point the reader has a right to ask the following question: How about static, power line induction, noises due to

street car trolleys, etc.? Will they not make an arrangement like this useless? The answer is, that they will, provided they are too strong or proper means are not provided to reduce them to an intensity where they will no longer disturb. If it becomes necessary to reduce them, a filter must be installed in the audio frequency circuit, preferably between the detector and audio frequency amplifier. See Fig. 14 for connections. In this circuit the condenser (C) has a capacity of 0.02 mfd. Both coils of the air core transformer (L) have a value of one henry each and the condenser (S) has a value of 0.01 to 0.05 mfd. and should be adjustable, at least in steps. The transformer (T) is an ordinary audio frequency amplifier transformer. The intensity of disturbances which still get through this arrangement can be controlled by the coupling at (L). It will usually be necessary to add a step to the audio frequency amplifier to make up for the losses in this filter.

It will undoubtedly take the average amateur, unless he has had considerable experience, considerable time to get an arrangement of this sort to work properly. He therefore should not become discouraged if he fails to make it work at first; he must design and make all details carefully if he is to expect results.

The following general hints will be found of value in amplifier work in general. The following are the usual causes for "noisy" operation of amplifiers, provided all, transformer, choke, etc., are properly designed:

1. Loose or dirty connections. All connections that are not made by means of substantial binding posts must be soldered. Springs in tube sockets must be sufficiently firm and properly adjusted.
2. Poor filament rheostats. These should always be of the step by step variety, provided with a good switch and never of the ordinary slide wire type. The resistance wire in the slide wire types becomes oxidized due to heating and the action of the air, and the result is that an excellent

microphone instead of a good contact develops at the point where the slider contacts.

3. Defective plate batteries. Miniature storage batteries are the best. These are available on the market from the reputable battery manufacturers at a very reasonable cost. I recently investigated this matter and found that a 110 v. bank of cells would cost about the same as sufficient flashlight cells (110 v. battery) to last a year at the rate flashlight cells last when five or six tubes are operated from them. If flashlight cells are used, they should be properly mounted in containers filled with paraffine and means should be provided so that individual cells may be cut out as soon as they go bad, as one bad cell is quite sufficient to make an amplifier very "noisy." A lamp of the proper voltage and size, and never a voltmeter, should be used to test cells, as a voltmeter may easily give a false impression as to the condition of a cell due to the fact that it does not draw sufficient current to actually test a cell.

4. It may be found necessary to screen an amplifier from stray fields due to lighting circuits, etc., in order to make it quiet. A sheet iron box is the cheapest and best for this purpose.

5. The connection on the filament batteries of an amplifier should always be kept clean and free from corrosion in order to insure steady operation of the tube filaments. The best way to accomplish this for either Edison or lead storage batteries is to first scrape the connection clean, then tighten the connecting bolts as tight as possible without stripping the threads and finally giving the entire terminal a coat of vaseline.

The question as to whether tubes can be successfully operated on alternating current for receiving purposes is often asked. Tests show the following results:

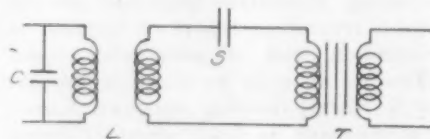


Fig. 14

1. For a single detector tube working in either an oscillating or non-oscillating circuit, fairly good results can be obtained. The hum produced by the a. c. is not sufficient to be very troublesome.

2. For an amplifier, if one does not exceed one step and is content with moderate amplification, the results are fairly satisfactory. If more than one step is attempted, the hum produced by the a. c. will drown out the signals.

3. For a. c. operation tubes having a stream line filament should always be used, as the hum is far louder with a tube having a so-called "hairpin" filament.

In conclusion, it is hoped that the material presented in this series, of which this is the last article, will be of some value to the radio amateur in solving his amplifier problems.

THE MAGNETIC AMPLIFIER

A Treatise on its Theory, Design, and Construction.
By Jennings B. Dow

Published by Permission of the Secretary of the Navy.

PART III.

FOR reasons which will be seen later, the iron core for this device will be made up of two concentric cylinders of equal length, which are to be connected magnetically by means of suitable "washers" at either end. The space included between the cylinders and the "washers" is used to house the control winding. We shall wind the radio-frequency winding axially, i. e., at right angles to the control winding to eliminate any possibility of mutual induction. See Fig. 8. The general dimensions of the core are governed by

primary modulating device to 1.2 ampere.

$$\frac{NI}{I} = \frac{4300}{1.2} = 3600 \text{ turns required}$$

Number 20 D.C.C. magnet wire may be selected as the proper size. The method of selecting this wire will not be gone into detail with, at this time. It is based, however, upon a radiation factor of 5 watts per square inch, which is allowable for this class of solenoid construction.

With this wire, it is possible to wind approximately 600 turns per square inch of section; and a winding space six inches

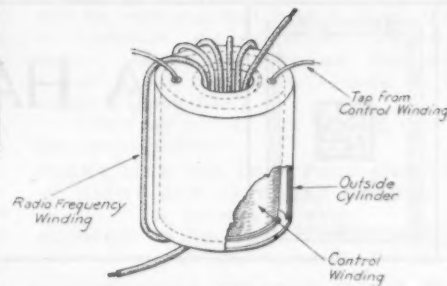
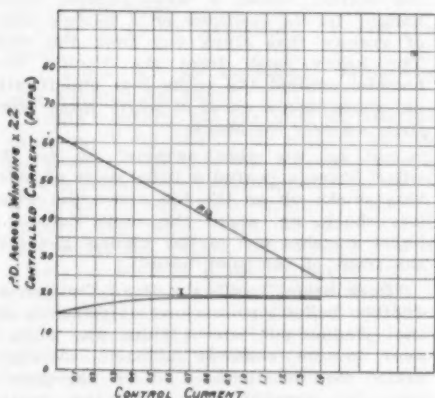


Fig. 8
View of 60 K. W. Relay

caution was necessary in order to prevent any induced currents from flowing around the lamina when changes in current in the control winding were taking place. It must be remembered that a short circuited turn having an appreciable resistance, induc-



RESULTS OF 60 CYCLE TESTS.

Fig. 9.

two factors, viz., the cross section of the control winding and the overall diameter of the "Litz" used in winding the radio-frequency coil.

By referring to the curves, Fig. 1,

$$H = 180$$

$$B = 17800$$

$$r = 120$$

$$0.8B1$$

$$\text{and } NI = \frac{0.8B1}{r}$$

where NI = ampere turns

l = length of magnetic circuit
(This equals twice the length of the cylinders plus twice the length of the flux path thru the "washers.")

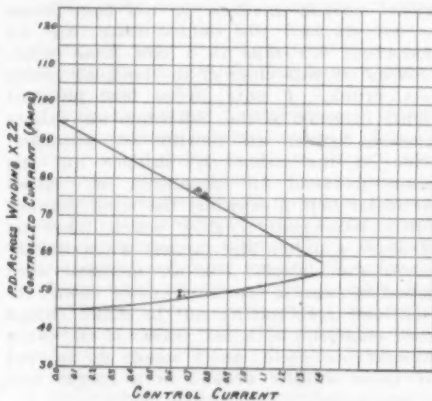
By means of an approximation, the value of l may be found to be about 36 centimeters. Substituting the values of B , M , and l in the above equation,

$$NI = 4300 \text{ ampere turns required in the control winding.}$$



Fig. 14
Detail, 60 K. W. Relay

In this particular case, the maximum allowable control current was limited by a



RESULTS OF 60 CYCLE TESTS

Fig. 10.

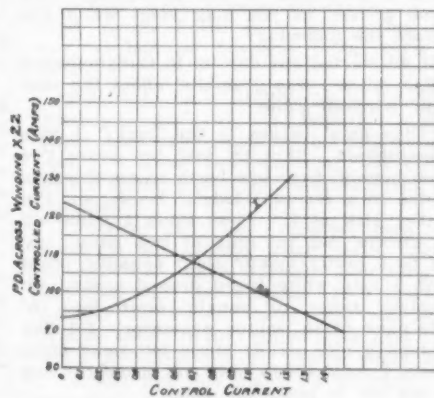
long by one inch in depth will be used.

The core for this device was built up in the following manner. The sheets of "Apollo," as they are obtained from stock, are 30 by 96 inches. These sheets were cut into strips 6 by 96 inches, and strips of 5 mil fish paper were cut to similar dimensions. A 3-inch wood mandrel was next made and placed between centers in a lathe and the process of winding the smaller cylinder was begun. The strips of iron and paper were wound together in order to prevent short circuited turns of iron, and successive strips of iron were insulated by overlapping the strips of paper. Twenty five complete turns of iron and paper were wound up in this manner, care being taken to wind same as tightly as possible. This made a cylinder having a wall one-half inch in thickness.

The larger cylinder was constructed upon a mandrel 6 inches in diameter and in a similar way. Only thirteen complete turns of iron and paper were used, however, in order that the cross section of the two cylinders might be equal. This made up a cylinder having a wall slightly over one quarter inch in thickness.

After each cylinder was completed, the ends were cut back one-sixteenth inch to provide a smooth surface and each cylinder was covered with a layer of cotton tape and shellaced.

The end pieces, or "washers," which connect the two cylinders magnetically, were built up of lamina of the same grade of iron as was used in constructing the cylinders. The fact that the magnetic circuit thru these "washers" had to have the same cross sectional area at all points, was carefully considered in the design of these "washers." A gap having a width of one-sixteenth inch was cut in each lamination to open the loop formed by it. This pre-



RESULTS OF 60 CYCLE TESTS

Fig. 11.



Fig. 13
Partial Assembly, 60 K. W. Relay

tively related to any circuit in which a changing current is flowing has the property of damping the changes of current in the circuit. In assembling these "washers," each lamination was insulated from the next with 5 mils of fish paper. The "washers" were, in turn, insulated from the cylinders with 10 mils of mica, which overlapped the cylinders slightly to prevent any possibility of sparking due to induction from the radio-frequency winding.

The control winding was made in two

(Continued on page 29)

A HARD-BOILED BUNCH

BY V. G. MATHISON

Author of the Samuel Jones Series

MAYBE some time or other while thumbin' the pages of your call-book you have come across the call letters K-V-I. If you did, they probably didn't interest you. All the book has to say is "K-V-I, Unga Island, Alaska." There ain't no details, an' the type is pretty small. By rights it should be printed in letters a foot high, while as for th' details—well, a while back I happened to get acquainted with some of 'em, as you may judge when you peruse the following:

It all started one day up in Cunningham's office, when I was grumblin' about the sea-goin' wireless game.

"This goin' to sea is the bunk," I tells Cunningham. "For th' last ten years I've been hoppin' from one berth to another like a flea in a ten-cent lodgin' house, an' I'm gettin' sick of it. First thing I know I'll be growin' old an' gray at this game; an' I'll be a pretty lookin' sight poundin' brass with a long white beard draped around th' receivin' tuner, or hangin' down into th' drip-pans of th' motor generator. I'd like to land a nice steady shore job some place where I could settle down an' spend th' rest of my life in peace an' quiet."

"If you mean that, you've took the notion into your head at just the right time," exclaims Cunningham. "The Alaska Codfish Company down on Steuart street are looking for a man to go up to Alaska and run their wireless station on Unga Island."

That afternoon we breezes down to Steuart street, an' Cunningham introduces me to the big chief of the cod-fishin' concern, a gentle an' friendly ol' war-horse with a sea-tanned map an' snow-white hair.

"Unga Island is the largest island of the Shumagin group, on the south side of the Alaskan peninsula," he tells me. "It's about half way between Kodiak Island to the northeast and Dutch Harbor to the southwest. There is a naval radio station at both of these places, but none in the six hundred mile stretch between. That is why we built a station of our own on Unga Island. The station is at Unga, an Aleute village on the southern end of Unga Island, where we also have the headquarters of our cod fisheries."

"Is it a quiet place?" I asks.

"A mail boat calls at the island about three times a year," he answers. "And there is otherwise no touch with the outside world, except through the wireless station. There are no passenger steamers running there; in fact, no vessels of any kind but our own fishing schooners. It should be quiet enough, if that is what you want."

"Yes," I replies. "Is it a permanent job?"

"Absolutely," he answers, in a tone like he meant it. "In fact, you will be required to sign a contract to stay two years. I can assure you that you'll like Unga. You have a fine two kilowatt set to handle; and the people are very congenial."

"Then what's th' present operator leavin' for?" I asks. "Is he retirin' on account of old age?"

"No, he has—he has ceased to operate," he answers, with a queer kind of a twinkle in his eye. I didn't exactly understand that, but I guessed it was all right, an' I signs the two-year hitch.

Three days after, I gets aboard the "Ma-weema," an ancient-appearin' an' bad-smellin' three-masted sailin' schooner, loaded to th' scuppers with salt, an' tough-lookin' codfish snailers. A tow-boat drags us out through the Golden Gate, an' we shake out our rags to a cold head wind. Soon as we was clear of the land, all hands gets drunk. I puts in a few pleasant nights listenin' to the fishermen an' sailors forward fightin' an' howlin' an' whoopin', while in the cabin th' skipper an' the mates gambled an' squabbled an' raised particular hell. Meanwhile the wind changes into a southeasterly gale, which takes us off shore a-flyin'. The farther we went, th' harder she blowed. Jibs an' mainsail were ripped to rags; a top-mast comes down; th' deck-load goes adrift; an' to make things more comfortable, a sea tears off th' cabin skylight one night, an' I wakes up to find my grips sloshin' around in a couple feet of sea-water.

After forty-three days of head winds an' hurricanes, we sights Simeonof Island, a gigantic snow-covered pyramid of lava stickin' up out of the ocean, on the outer edge of the Shumagin group. A squally southwest gale drove us by Simeonof, an' on into the Straits of Nagai, where I had my first look at Unga Island. It was about eighteen miles long, an' maybe six wide, fringed with reefs an' rocks, an' topped with two towerin' white peaks. We comes sweepin' up Nagai Straits on the wings of the snow-storm, an' comes at last to anchor in Squaw Harbor, a little cove on the eastern side of Unga Island. Accordin' to the charts, the town of Unga was about eight miles away, on a little inlet called Delarof Bay.

The next mornin' a power-boat, the "Alasco II," comes round from Unga, an' I goes back on her. She was piloted by a crazy-lookin' highbinder with a long droopin' black moustache, an' a pair of fists like rhinoceros' knuckles. After informin' me that his name is Hammar th' Head-Cracker, he inquires who I am. When I tells him I'm a key-puncher, he looks glum.

"Yuh won't be here long," he says, darkly. Then he shuts up like a clam.

After skirtin' a few miles of high, dark cliffs, we finally swung into Delarof Bay; an' I saw the town of Unga. Down at the foot of a steep, snow-blanketed mountain I saw a gloomy-lookin' village—frontin' on the bay a hundred small houses an' shacks; down on the beach some weather-beaten warehouses an' sheds. Up on a knoll in the middle of the town stood a government commissioner's combination dwellin'-shack an' court-house; below that a hard-lookin' dance hall grinned in the face of an old tumble-down Russian church. Farther up on the rise was a cemetery twice the size of the town, bristlin' with white-painted crosses, set so thick that from the bay they looked like a field of daisies.

Just above a little wharf, juttin' out from

the beach, was a steep, rocky knoll about a hundred feet high, an' on top of it were the wireless masts. They were maybe a hundred an' thirty feet high, an' four hundred feet apart, an' were loaded down with heavy guy-wires—to keep 'em from bein' blowed clean to Kamchatka, the Head-Cracker 'explains.

Half way down the face of the hill was the station house, a white-painted shack hangin' by its eyebrows on a narrow ledge of granite that stuck out from the cliff. The heavy swell from the Pacific was boomin' against the rocks just underneath, an' sometimes a cloud of white spray went flyin' up over the shack.

Just as we were swingin' up to the wharf there appeared a little spurt of pale-blue smoke up on the hill above the wireless shack, an' about the same instant a bullet smashes one of the window panes in the front of the pilot house.

"Duck below!" yells the Head-Cracker, as another bullet rips a cloud of splinters off the window sill, an' a third one puts a dent in the compass binnacle. Without askin' no questions, I dives inelegantly down a companionway into the engine room. As I crawls up behind the engine, on the lee side from the bullets, I sees the Head-Cracker haul a young cannon outa his jeans an' start blazin' away at the guy up on the hill. He empties his six-shooter, reloads, an' empties her again—meanwhile the fellow on the hill busts a few more panes of glass, an' puts half a dozen holes through the bulkhead. Just as the Head-Cracker was loadin' his gun for the fourth time, the shootin' from shore stops.

"Is th' battle over?" I asks, stickin' my head up through the companionway, cautious like.

"Not by a damn-sight!" roars the Head-Cracker, stowin' away his Krupp-junior. "It's only postponed till I git ashore—I'm gettin' weary of arguin' with that guy!"

"Then it was you he was bombardin', not me," I exclaims, feelin' a lot relieved.

"It's Hog-Tooth Wilson," sputters the Head-Cracker. "Coupla weeks ago we was figgerin' who'd licked the most codfish snailers last year, an' Hog-Tooth figgered he'd licked one more'n I had, so I licks him to make it a draw. Now he's goin' snoopin' 'round gunnin' for me, which ain't no way to treat a friend."

By this time we was alongside the wharf. Gettin' ashore, I meets the Brainless Swede, the superintendent of the codfishin' outfit, who shows me the way up to the wireless house. The Head-Cracker comes grumblin' along with my grips, but soon as we reach the shack he drops 'em and goes swearin' off up the hill with his hip-pocket artillery ready for action again.

The rectangular-shaped radio shack was divided off into three small rooms; one for the sendin' apparatus, a sleepin' room in the middle, and an operatin' room on the end facin' the ocean. The sendin' set was a trashy-lookin' made-to-order rig, with a lot of helices to get a twenty-five hundred meter wave—a two kilowatt panel set with a flimsy synchronous gap coupled up to an old condemned hoistin' motor that'd been

made over into an alternator. This was belted to a contrary-lookin' one-lung gasoline engine, on the opposite side of the room—about a five horse-power. A second belt from the engine went to another made-over motor, which furnished direct current to excite the alternator. The transmitter had a leaky oil condenser, a hammy-appearin' transformer, with a secondary windin' about the size of a ball of knittin' yarn, an' a phony oscillation transformer that looked like it'd been squashed by an elephant steppin' on it. That was about all there was to it, except for a lopsided name-plate on the panel, announcin' it was a "Hellkum Special"—whatever that is.

I started in right away to get the set in workin' order, but I was bothered a lot by people stringin' in with messages. One guy, a fur-trader, brought twelve at one lick.

"Some of these is kinda previous," he remarks; "but I want'a get 'em off while you're still here."

"Still here!" I exclaims. "I just got here!"

"I know it," he answers. "Otherwise, you wouldn't be here."

I didn't exactly get the drift of that just then, but I did later. By night I had the set in shape, an' fifty-one messages on file. It was snowin' an' stormin' outside, an' at 5 o'clock it was pitch dark. I figures I might's well begin tryin' to raise N-P-R, so I starts the engine; but when I gets in, I hears a devil of a racket bustin' up the ether. Listenin' awhile, I makes out it was N-P-R an' another loud synchronous spark signin' K-O-X-N, which I learns later was another codfish company station. They were havin' a grand wireless battle.

"I can pound brass a damn sight better than you ever will pound it, you mush-room-flsted son of a sourdough biscuit!" I hears the codfish code-slinger yellin' at the navy gink. "If you ever make any more breaks about my flat, I'll come up there an' make your homely map look like a busted tomato!"

"Aw, dry up, you fire-eatin' moonshine-guzzler," answers the gob at N-P-R. "You've got so many codfish flns growin' on your back you can't keep your shirt on no more,—better go jump in the ocean, where you belong, fishie."

"I'll fix you yet, you flat-footed, knock-kneed squaw-ehaser!" howls the codfish key-puncher. "I'm goin' to fill you so full of lead you'll have to go to your grave in a ten-ton truck!"

This keeps on for about half an hour, until both the gadget an' the codfish desperado was so mad they could only stutter on their keys like a couple of crazy omni-graphs. At last, I risks a call to N-P-R, but all I gets is a roar of Q-R-T's for about ten minutes; then all of a sudden I hears a new flat take the key at the navy station.

"K-V-I, K-V-I de N-P-R, N-P-R," he says. "Never mind those two little honey-birds—just havin' their usual evenin' lovin' match—both full of sourdough brew—bad stuff—I got your biz of last two months—seventy-two messages—Q-R-V."

"Yes, all set," I answers. "Got fifty-one here."

About 11 o'clock I had all his messages. I starts in to shoot mine, but before I'd got more'n seven or eight of 'em away somethin' goes flooey with the transmitter. I dashes into the power room an' discovers the sendin' condenser is shot. It takes about fifteen minutes to fish the busted section out of the oil an' stick in a new one. I starts hammerin' again, but on the sixteenth message the spark goes out of synchronism, an' dies slowly away.

I rambles out into the power room again, an' finds the couplin' between the gap an' the alternator is carried away. Lashin' it up temporary, I tackles the key once more, but on the thirty-third message somethin' blew up again. This time I finds the power room full of smoke, an' I discovers the transformer secondary is burnt black as a newly-wed's biscuits.

"Looks to me like I landed one nice, peaceful quiet little hell of a shore job, all right!" I mutters to myself, as I shuffles out a couple thousand transformer laminations to replace the burnt secondary.

On the forty-ninth message the engine stopped. As the lights were on the direct-current generator, this leaves the shack pitch dark. I lights a candle, an' finds the fuel-pipe to the engine is busted off the carburetor, an' gasoline is runnin' all over the floor. Blowin' the candle out quite instantly, I bandages up the pipe in the dark with a piece of friction-tape. At last, soakin' with engine oil, gasoline an' sweat, I drags through the fifty-first message, an' signin' off with N-P-R, I turns in to dream of millions of shootin' condensers an' explodin' gas tanks.

The next mornin' I meets Dopey Driffeld, the government commissioner, a sleepy old worm who'd been in Unga more'n thirty years, an' who seemed to be sufferin' from a chronic case of Alaska lazyritis. He tells me he's learned somethin' about wireless from previous brass-pounders, an' has a little spark-coil ham set of his own.

"Say, what become of the operator before me?" I asks him, as we stand out in front of the town pool hall. He starts to answer, but just then a vampy-lookin' little black-eyed girl comes trippin' along an' gives me a sly, teasin' smile. I starts to return the smile, with interest, but Dopey punches me in the ribs.

"Look out!" he whispers. "That's Mexican Frank's wife—he's standin' behind you!"

I peeks around out'a the corner of my eye, an' when I sees a bad lookin' Mexican standin' close by, glarin' green-eyed at me, an' with one hand on his shootin' gear, my smile freezes fast.

"You was askin' about yer predecessors," remarks Dopey, after a minute; "I'll show you where they is."

Leadin' me out into the cemetery, just back of the town, he brings me up to three white-painted pine slabs, all set nicely in a row. Takin' a slant at the first board, I reads this cheerin' inscription, done in crooked black letters:

"HERE LIES STANLEY HINCH

A Wireless Operator

DRILLED BY LONG BILL'S COLT

On the Last Night of September, 1920."

"He was the first one," asys Dopey. "He got full of moonshine one night, an' started singin' a Hungarian op'ra under Long Bill's bedroom window. Long Bill thought he'd got bit by a Malamute mad-dog an' was dyin' from hydrophobia, so he shot him to put him out'a his misery. Bill always was a kind-hearted ol' fence-rail."

By this time I was readin' the second slab:

"HERE LIES FRANK MYERS

A Wireless Operator

STUCK THROUGH THE GIZZARD

By Dago Mike in Soapy's Barroom
December 5, 1920."

"What'd he do?" I asks.

"He was a nice boy, but he was plumb foolish," replied old Dopey, pensive-like. "He mixed into a war argument in Soapy Komeda's soda water joint, an' said 'hell with th' kaiser.' Right there German Charlie yanks out his gun an' makes the chauco stand up on th' bar an' repeat

'Hurrah fer th' kaiser!' fifty times, but before he could get done with it, Dago Mike, th' bartender, got peeved an' rammed a butcher knife clean through him—Mike always was a good patriotic Dago, so we couldn't blame him."

I didn't say nothin', but rambles over to the third signboard:

"HERE LIES THE LEFT FOOT AND THE RIGHT EAR OF EDGAR NELSON

A Wireless Operator

BLOWED TO HELL BY NITROGLYCERIN
February 7, 1921."

"Edgar stayed with us th' longest—three weeks," says Dopey, thoughtful-like. "One day he went to visit th' gold mine up th' bay, an' just fer a joke Hardpan Pete slips a can of triple X blastin'-caps in his pocket. Comin' back to town, Edgar fell down a cliff, an' all we could ever find was his left foot an' his right ear—we knew it was his right one because Bull Barney, th' moonshiner, had nicked it th' day before, practisin' with a new automatic. I was sorry to see Edgar go to pieces that way, but he had no business fallin' off'n the bluff."

"Seems to be a healthy place fer brass-pounders, don't it," I remarks, already seein' four little slabs in the code-slinger's row. "I know now what th' old bird in Frisco meant about that operator ceasin' to operate."

"There's only one wireless man ever stuck it out around these parts," replies Dopey, "an' that's Fightin' Hell-Fire, the guy that built this station. He's just built another at Pirate Cove, over on Popoff Island, about twenty miles from here. The call's K-O-X-N—mebbe you've heard him."

"Yes, I did, last night," I answers. "He seems to be a lunatic."

"That he is," declared Dopey, fervently; "an' he's a tough guy. Besides his reg'lar six-shooter he packs a little Colt automatic in his mackinaw pocket; an' th' other day I seen him shoot a wart off'n Black Ola's nose at a hundred feet without even pullin' th' gun out'a his pocket—shot right through th' cloth. H'll probably be over soon's we have a storm—he has a fishin' dory with a little engine in it, but he never travels unless it's blowin' a hurricane—says he gets tired moochin' along in a boat in calm weather."

Just as we was leavin' the cemetery, I notice a couple fellows comin' with picks an' shovels.

"They're comin' t' dig a hole for Hog-Tooth Wilson," says Dopey, yawnin' like it didn't amount to nothin'. "Th' Head-Cracker plugged him last night in self-defense—Hammar never would stand fer anybody abusin' him."

Durin' the next three weeks I didn't see much of anybody. I didn't feel like venturin' out of the wireless shack, an' anyway, the set didn't give me a chance. I never got through a schedule with N-P-R without a couple of breakdowns. First a condenser would shoot; then the gap-electrodes would strike an' break off; the gasoline pipe busted again; wirin' shorted in the conduits; fuses blew; the engine coolin' tank springs a leak an' floods the joint; an' chronic hot bearin's on the alternator throwed the belt off, which wound up in the engine flywheel an' got tore to strings. Considerin' everything, I had a right pleasant time.

The engine kept gettin' crankier every day, until at last she laid down on the job an' quit fer good. I primed an' oiled an' sweated an' swore, but 'twasn't no use. The next day it was blowin' a howlin' storm. Big seas were boom'in' against the rocks under the wireless house, roarin' like

(Continued on page 22)

A CONDENSER THAT HOLDS ITS OWN

MR. H. C. BROWN (6CH) has a transmitting condenser that will hold its own against anything yet devised. The condenser operates on the oil-cooled principle and is remarkably efficient in operation. Many requests have been received from Pacific Coast radio men regarding the construction of the condenser and for this reason the constructional details are published herewith.

The only materials necessary for its construction are twelve aluminum plates, size 24 gauge; twelve sheets of a good grade of photo glass or window glass that is free from air-holes and other defects; a wooden tank container for the unit; two brass con-

necting rods for the plates and 36 lengths of No. 15 soft drawn copper wire for the use of separators.

merely short lengths of No. 15 soft drawn copper wire, bent as shown in Figure 5. Three of these separators should be riveted to each aluminum plate as shown. The purpose of these separators is to allow the oil to circulate between the units and thereby afford an excellent cooling surface for the entire condenser, the best method of preventing break-down.

In assembling the condenser it is important that a right hand plate faces a left hand plate. All right hand plates are connected together by means of a long threaded brass rod. Nuts should be used to secure each plate to this rod. The left

If you have been experiencing trouble from condenser break-downs, here is one that will eliminate your trouble.

and fill the container with castor oil or a good grade of transformer oil.

This condenser has held up for many months under a strain of 45,000 volts. Many others failed to hold up under the strain. The total capacity of this condenser is .006 mf. each unit being .001 mf. capacity. To increase the capacity, add more units. It may be well to state that the entire unit should be firmly bound with tape, making it an easy matter to insert same into the container.

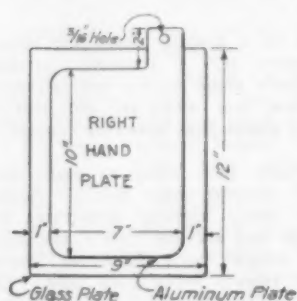


FIG. 1

necting rods for the plates and 36 lengths of No. 15 soft drawn copper wire for the use of separators.

The size of the glass plates can be obtained from the accompanying drawings. The aluminum plates must be cut as shown, with a lug cut from the same sheet as the plate itself. It will be observed from the drawings that there are two kinds of plates, left hand plates and right hand plates. Six of each are needed. The corners must be rounded as shown, and rubbed to a polish with steel wool to prevent all brush discharge. Six holes are drilled into the aluminum plates as shown in Figure 5. These holes are used to allow three separators to be riveted to the back of the aluminum plates. The separators are

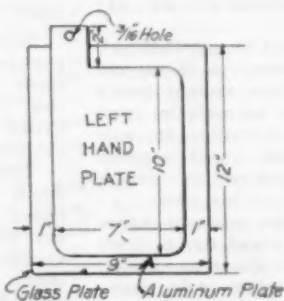


FIG. 2

hand plates are assembled in like manner. Binding posts should be attached to the ends of the connecting rods for the usual terminal connections.

The container best suitable for this condenser is, of course, either a glass or rubber case but the following method of construction for a container has been in use by 6CH for a number of years and has given excellent service: Construct a hardwood box, just large enough to hold the unit snugly. Before assembling the box give it one coat of diluted Le Page's glue. After the first coat dries, apply two coats of heavy glue. Then assemble the box with nails or screws and blue the edges, being careful that the glue covers all corners of the box. Allow the glue to dry

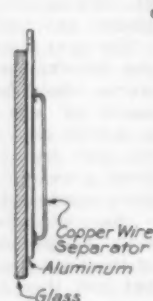


FIG. 3

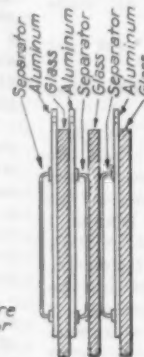


FIG. 4

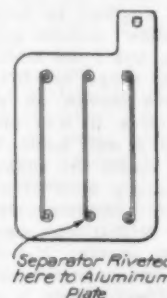


FIG. 5

STAG PARTY AT S. F. RADIO CLUB

JUNE 30th will long be remembered by the unusually large number of radio men who attended the San Francisco Radio Club's Stag Party. It was a lively affair from start to finish. Refreshments, musical numbers by radio telephone, smokes and entertainment were on the program of the evening. The radio raffle was the talk of the town. Vacuum tubes, meters, varimeters, radio books, magazine subscriptions, tuners, phones, horns and an abundance of other apparatus were raffled.

The affair was given wide publicity by the various radio telephones in San Francisco and was a marked financial success.

STOLEN AUTOMOBILE RECOVERED BY WIRELESS

BOSTON has recovered its first stolen automobile by means of wireless. The recovery was reported by the Cambridge police and Scouts Charles and Edwin Barney of 20 Breamore road, Newton, have now qualified as radio sleuths.

The automobile, a Peerless roadster, owned by Arthur Vinton of Highland avenue, Somerville, was stolen near Harvard Square last week. A wireless flash announcing the theft was broadcasted Saturday night, in accordance with arrangements made with the Boston Police Department, and picked up by radio amateurs within a hundred mile radius.

Early one Sunday morning Charles Barney, aged 18, assistant scoutmaster, was walking near his home on Hunnewell avenue, Newton, when he discovered a car similar to the description sent out by wireless. The young man hurried home, secured the detailed data (registration, engine,

serial and model numbers)—which his brother Edwin had received with his small wireless outfit—and, finding that his information checked with that of the automobile, which was empty, promptly notified the Cambridge police. Two patrolmen answered the call and the machine today is resting in its owner's garage.

The recovery of the machine marks the first important result secured by the Boston Police Department in sending out wireless broadcasts each night in connection with missing automobiles, men wanted for misdemeanors, missing persons, etc.

About a month ago Commissioner M. J. Crowley secured the assistance of the American Radio and Research Corporation, Medford Hillside, and nightly police reports of the above description are broadcasted from the company's high-powered sending station. Reports are telephoned from police headquarters at Pemberton Square at the close of each day to the sending station at the factory of the American Radio and Research Corporation. The reports are then

flashed by both wireless telephone and telegraph. When sending out by telegraph the messages are sent very slowly at ten words a minute and are repeated three times to insure their reception. Wireless operators within a radius of one hundred miles pick up the reports and then are asked to refer them to the local police.

Returns have shown, according to the police, that the reports are distributed in the large majority of cases. Records are at hand which show that this has been done as far west as Fitchburg and as far east as Marion.

Reports are sent out from headquarters at Pemberton Square at 7:40 p. m. and are broadcasted by wireless at 8 o'clock at the Amrad station.

As there are many thousands of interested radio amateurs in the metropolitan district, it is expected that further notable achievements will be made in the near future.

6CH

A SAN FRANCISCO STATION WITH AN ENVIABLE RECORD FOR LONG DISTANCE COMMUNICATION

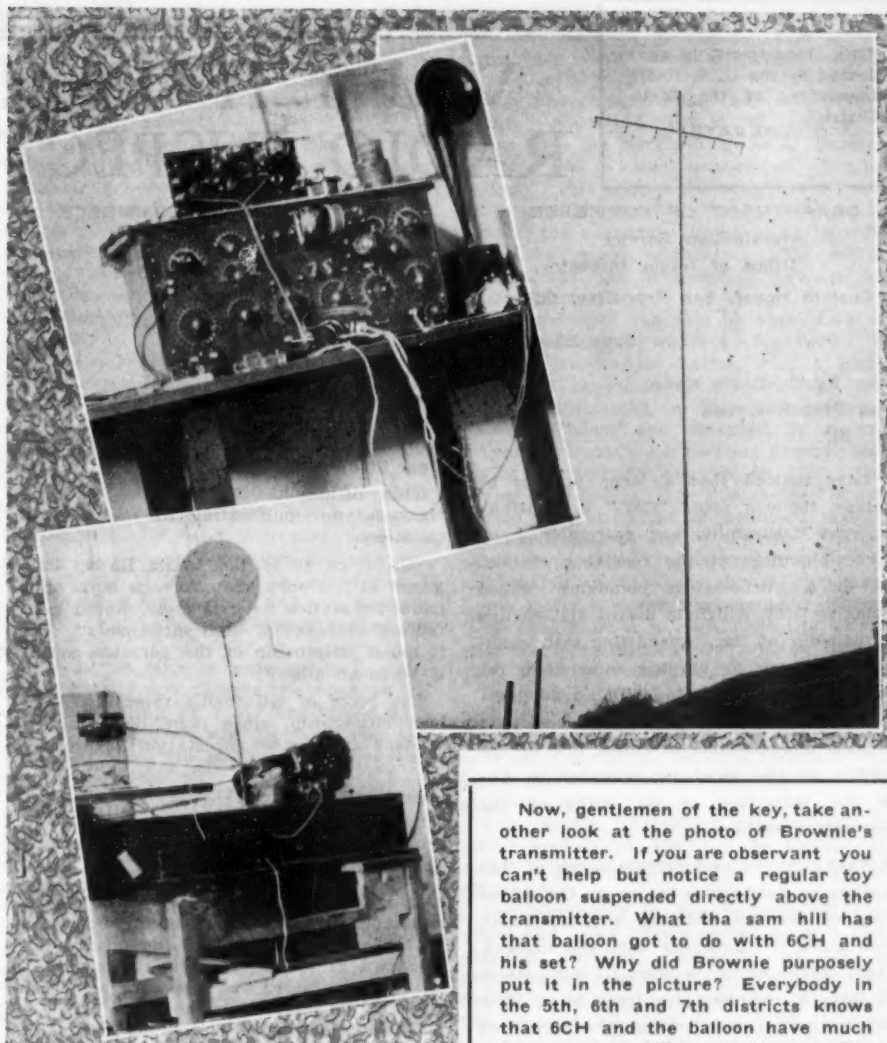
YOU can't expect to get results from your set unless you 'stick with the ship', and it is a mighty rare occurrence that luck will bring results."—6CH.

BROWNIE, as we all know him, is the proud owner of station 6CH. Why shouldn't he carry around that contented smile of his when he has the distinction of working fourteen "seven" stations the first night that he busted into the air with his 1-2 K. W. transmitter.

"If every Western amateur would play the game as squarely as 6CH," remarked a certain individual, "all would be well."

Brownie thinks nothing of standing by for three hours to give the other fellow a chance. And everybody in the West knows how things begin to move when 6CH gets started.

His radio experimenting dates back to 1914 and he has ever insisted on having one of the highest "sticks" in town. Take a look at the photo of his present mast. It is 103 feet high, while another mast, 35 feet high, suspends the other end of his six-wire aerial. The aerial is 78 feet in length; lead-in is 17 feet long, and the ground is 20 feet from his apparatus. Now, then, observe the transmitter. Everything neatly arranged—no efficiency lost, strayed or stolen. No wonder he has been heard by the following stations: Fifty stations in the seventh district, from Portland to Moscow, Idaho; Salt Lake City, Utah; Southern California, and has also worked stations in Arizona and New Mexico. His radiation is just a little under three and three-quarters amperes. Reno, Nevada, and Los Angeles have been worked between 5 and 6 P. M. Usually the station is not in operation until after 10 P. M., as 6CH has always been known as a "night owl"—being a moving picture operator. The transformer is of his own construction. It is of



the closed core type with a 24,000 volt secondary. A Murdock oscillation transformer, 6-point rotary running at a speed of 3450 R. P. M., glass plate condenser of 0.006 M. F. capacity and an aerial ammeter constitutes the transmitting equipment.

His receiving apparatus is also home-made. Specially constructed honeycomb coils are used for the tuner. With this receiving set he has heard 5ZA, 6ZA, 7CC or ZM, 9UE, 9WU, 9EE, 9UV, 9AG, 8UE and others too numerous to mention. A Magnavox is used to throw the signals from the seventh district stations all over the house, using only two steps of amplification.

Now, gentlemen of the key, take another look at the photo of Brownie's transmitter. If you are observant you can't help but notice a regular toy balloon suspended directly above the transmitter. What the sam hill has that balloon got to do with 6CH and his set? Why did Brownie purposely put it in the picture? Everybody in the 5th, 6th and 7th districts knows that 6CH and the balloon have much in common. What is the peculiar relation of one to the other? Out with it, fellows!! The editor of the "PRN" has five crisp one dollar bills that he is going to give to five of us amateurs who send in the best answers to the above question. You don't have to be a subscriber to enter the race. Get busy now—shoot in your answers and win a dollar. The names of the winners, as well as their answers to the big balloon mystery question, will appear in the next issue of the "PRN." The judges of the contest will be five prominent local radio men. All answers must be of no more than 50 words in length. Let's go!

CORRESPONDENCE FROM OUR READERS

SAN JOAQUIN LIGHT & POWER CORPORATION

General Office

Fresno, California

June 26, 1921.

Mr. P. R. Fenner,
50 Main Street,
San Francisco, Cal.

Dear Mr. Fenner:

I cannot refrain from writing my appreciation of your Radiatorial, in the July issue of PRN, on correct sending. You certainly said a mouthful, and voice my views precisely. Isn't it the truth, though, that a great many fellows have no sense of time intervals, likewise with a lot of

amateur musicians. The way some of these DX operators rush through with their msgs, one would think that it was a life and death matter, only to have to ask for repeats and in that way cause considerable unnecessary interference. I have always held that amateur operators should have to send up to some standard, before being permitted a license. That would work a hardship on Radio Inspectors, most likely; but would, without any doubt, have the desired effect on code sending.

I have had fellows come to me for code tests and complain that they could not read my sending because it was too precise and machine-like. The trouble was that they were used to slipshod, careless sending and I tell them, what a small chance they would have in passing the

Inspector's Omnigraph code test. While I have preached my ideas of good sending to the local amateurs, only to have it go inot one ear and out the other, it certainly gives me a lot of satisfaction to have a professional come out as you have done and take them to task. With very best wishes, I am, as ever,

Your friend,

(Signed) R. C. DENNY, 6CS.

The Formica Insulation Co. have recently appointed the Northwest Radio Service Co., 609 Fourth Ave., Seattle, the exclusive Northwest distributors for Formica sheet and tubing. This company has recently installed machinery for cutting Formica panels to any desired size.

This Department is conducted by the U. S. Radio Inspectors of the Sixth District.
CO-OPERATE!

WITH THE RADIO INSPECTOR

Questions answered by the inspector.

No names will be printed. Initial your letters only.

DEPARTMENT OF COMMERCE

Navigation Service
Office of Radio Inspector,
Custom House, San Francisco, Cal.,

June 26, 1921.

Editor Pacific Radio News,
San Francisco, Cal.

Dear Sir:

I have noticed that a large number of amateur stations using "CW," or continuous wave telegraphy, are extremely hard to keep in tune at the receiving station, due to a phenomenon commonly called "swinging," by which is meant the change in frequency of the transmitting test, causing a swinging or varying tone when received on a receiver using heterodyne principles. This often is so troublesome that reception is impossible at times, due to the inability of the receiving operator to follow the variations of the wave of the transmitting station.

A very common and prolific cause of this troublesome occurrence is due to the actual swinging of the transmitting antenna itself. When a set is tuned, say with the antenna at rest (there being no wind to move it) it will have a definite capacity. Now, if a wind comes up, and swings the spreaders of the antenna, in such a manner that they approach nearer the earth at times (although this might be only a few inches) a great difference in the received "beat note" will be observed. This is due to the slight variations in the antenna capacity, due to the swinging, which will cause the note to vary. This can be readily eliminated by building the antenna in such a manner that it will not swing—using "downhauls" on the ends of the spreaders to keep them steady, etc. The lead-in wires should also be drawn tight, and not allowed to swing, as is common practice.

Overloaded DC plate supply generators will often cause swinging, in some circuits, also. When the circuit is loaded, the DC generator will have a certain potential. Now, when the key is opened (using pure CW telegraph) the generator will speed up due to there being less or no load. This will cause a rise in voltage, which, in turn, will result in a higher voltage being impressed on the transmitting circuit when the key is again closed. The greater voltage will cause a change in the radiated wave, due to everything in the set being at a higher potential, which will result in a variation of the note in the receiving equipment. This change is slight, it is true, but will be enough to cause a considerable change in the "beat note" at the receiver. This may be eliminated to a large

DEPARTMENT OF COMMERCE

Navigation Service
Office of Radio Inspector
Custom House
San Francisco, Cal.

June 21, 1921

The Editor,
Pacific Radio News,
San Francisco, Cal.
Dear Sir:

This office has been asked to reply through your publication to the following question:

"On Page 66 of the Radio Laws, Paragraph 149, it says that 'foreign born applicants for station licenses must submit satisfactory evidence of their citizenship.' Does it mean citizenship of the person's country if he is an alien?"

The proof of citizenship refers to American citizenship, since none but American citizens are eligible for station licenses.

Respectfully,

(Signed) J. F. DILLON,
Radio Inspector.

extent by shunting the key with a high resistance, which should be of such value that about 25 per cent of the normal load is drawn at all times. This throws a load on the generator, and prevents an excessive rise in potential on no load.

When it is considered that on 200 meters the frequency of the oscillations is one and a half MILLION cycles, and that a change of one meter will make a change of 5,000 cycles, a very slight change will be enough to cause such a large variation of the actual frequency, that the beat note at the receiver is lost. Say you are radiating on 200 meters. Now, if the antenna swings a little, and changes the wave by a tenth of a meter (which is far beyond the reading of an ordinary wave meter), the beat note will have changed by 500 cycles, and the beat note will be absolutely lost. A much smaller change than this will usually be sufficient to set up unreadable swinging in the receiver.

Respectfully,

(Signed) D. B. McGOWN.

QUESTIONS AND ANSWERS

Q. Please answer through the "Pacific Radio News" whether or not it is permissible for amateurs to converse on anti-prohibition matters via radio. I have heard several amateurs converse freely on this subject and, being a firm believer in prohibition, I would like to have your opinion on the subject. It is lawful to discuss this matter by radio to such an extent that a joking matter can be made of a pre-night's "overflowing bowl" party? I have also heard amateurs invite others to their station to "have a drink."

S. L., Berkeley.

Ans. No limitation is made under the laws and regulations concerning the matter transmitted via radio, provided it does not conflict with law and order. The only

definite regulations covering the above case is Paragraph 210: "No person shall transmit or make a signal containing profane or obscene words or language." It is not believed that any discussion of the kind mentioned above could be classed under this head, unless actually the operators did swear over the apparatus. A good deal of this matter is sent over the air just to act "smart," and is in most cases just mere bravado, and naturally cannot be subject to censure, unless the said operation causes interference with other communication, in which case the stations and operators would be guilty of unnecessary interference, for which they could be penalized.

Q. How long can two stations hold the air without fear of suspension of the station license? Can two stations communicate with each other for a whole hour without even waiting to hear if somebody else wants the air? If two amateurs are talking together for a long time and I want to send, are they required to stop and give someone else a chance?

C. S., San Francisco.

Ans. This depends on the class of traffic being handled, and the needs of the individual case. If the long-continued use of the air is necessary, as handling legitimate traffic, etc., while the person waiting is simply desirous of "chewing the rag," the former stations should have priority. It is the purpose of the Department that everyone should obtain the maximum benefit from the operation of their stations, hence stations unmercifully "hogging" the air are clearly guilty of violations of the laws and regulations concerning the transmission of superfluous signals, and of interference. If the stations are located in a district where traffic schedules are in effect, any unnecessary communication during the long-distance periods will be considered as willful interference, and the violators treated accordingly. It is probable that the case referred to in your question, the interference caused by the stations mentioned was due to the use of excessive power for short distance work—another violation of the laws and regulations.

Q. Under the new license provisions for commercial gradings, what grade of license would I receive upon expiration of my present commercial license, which has been used only in operating an amateur station during the past two years?

A. E., Oakland.

Ans. If you have not had any commercial experience you will be examined for commercial First Class Third Grade. If you have had the necessary experience (at any time, whether on the last license held or not) for a First Class Second Grade you may be issued a license of that grade. If you can copy 25 words per minute, you may be issued a First Class First Grade License, also provided that you have had the required experience for this grade. The issuance of all these licenses will, of course, depend on whether or not you successfully pass the code tests and written examinations. The operation of an amateur station does not entitle the holder of a commercial license to renewal, except by re-examination.

CONTINUOUS WAVE MATTERS

By Lawrence Mott
(Associate Editor)

Progress along all lines of endeavor that are distinctly new, is, of a necessity, somewhat slow. I have, however, been pleasantly surprised at the interest shown in CW by many operators.

There is a well-known amateur in the Southland, with a "Z" license, who is most enthusiastic, and an energetic booster. From him I have received some very excellent suggestions for CW work, and I take a great degree of pleasure in herewith reproducing parts of his missive, withholding his name only because of his especial request to this effect. Such modesty on the part of an eminently successful operator deserves a place in the spotlight of amateur radio!!

His letter follows:

"* * * I have a suggestion to make. QRN is with us, arcs annoying many stations, and there is always the QRM to contend with. I would ask that you form some scheme for the CW stations to work on schedule, assigning each station a certain, definite time for broadcasting CW messages, preferably normal traffic, but if there is none such to transact, then a QSU or a short QST.

Now let us see how this would work out. A general plan being devised by you, the calling time for CW might begin at 9 P. M. and one might then listen in and hope to hear stations using CW as follows:

9:00 P. M. 6AAD, QST and traffic.
9:10 P. M. 6EN
9:20 P. M. 6IX
9:30 P. M. 6ALE
9:40 P. M. 6ZB
9:50 P. M. 6HU, etc.

Adding to this proposed list, times for other CW men who might wish to join us. Do you think that we might get somewhere in this way? A plan could be worked out, especially during the summer months, for the putting over of traffic in the hands of certain CW stations, and then interesting 6ZZ, 5ZA and others beyond the dead spot, to pick up Eastern traffic on CW, much as 2ZL broadcasts at 9:30, 10:30 and 11:30 P. M., getting QSL's by mail later. (See "QST" for April, 1920, Ppg. 13.) At least something can be probably worked out by you whereby the efforts of CW will be co-ordinated! Even the Government stations are all on a schedule and it seems to me that an informal CW schedule might promise gratifying results. * * *"

I am forcibly and favorably impressed by the practical usefulness of these suggestions and I would earnestly ask CW men to "line up" and get going.

Some CW operators have given me their names and station details, but not enough to make a really good showing. Why not seriously consider Mr. —'s ideas, and from the date of the appearance of this number of PRN, begin a schedule exactly as proposed in the communication that I have reproduced? Can we CW men but once let it be thoroughly understood that AT certain hours and minutes there is some CW set operating there would be much more listening-in!

The fact that CW will successfully handle traffic through QRN and QRM that would effectually "kill" spark results, is too well known to require wearying explanations on my part.

Personally speaking, 6XAD will, from July 28th, be working and listening each night from 9 to 10 P. M. The waves will be 200, 240 and 375, varying them until I

can ascertain which is the more easily found and read. I rather think that the 240 will do the trick, although there are so many "broad" (!!) spark stations within 75 miles of Avalon that QRM may render the 240 wave impossible!

It is a self-evident fact, I think, that until such a time as we CW enthusiasts have a regular schedule, and abide by it, one with the other, nothing of any great satisfaction or value will be accomplished, and it seems a great pity to lackadaisically let matters "slide" in haphazard fashion, picking up CW when one "happens" across a CW note, but otherwise doing nothing systematically!

Mr. —'s pointed remark, to the effect that the Government Stations are all on schedule, meaning, I take it, the more powerful arcs—should indubitably prove that a schedule is the only means of reliable results.

Will 6EN, 6IX, 6ZB, 6HU, and all other CW men, get in touch with me as soon as they conveniently can? Will they take the trouble of choosing some ten minutes between 9 and 11:30 P. M., in order that I may publish a list of these and rely on such operators to be "present" when called on the air?

As it is too long to wait until the September PRN I will assume the work of intercommunicating by radio and letter with all CW men who will forward me the times that they will be "on." In this way we can begin SOON!

Must CW dribble pathetically along? Or shall we, by a little co-operation, show it up for that which it really is—the most efficient and up-to-date method of radio communication!

I do not wish to be thought a "nag" or a nuisance, but it IS a pity to permit Opportunity to slip by, night after night, making no attempt even at profiting by it!!

"Time and tide" (and radio!) "wait for no man!"

Paraphrasing the famous poem:

"Let us now be up and doing,
With a heart for any fate—
Still a-listening and a-working—
Learn to tune around and wait!"

Turn to Page 21 for Schedule of C. W. Traffic

INTERRUPTERS IN VACUUM FOR MODULATION IN TRANSMISSION AND RECEPTION

By Frank E. Summers, A. M. I. R. E.

WITH the increased use of undamped by amateurs, professionals and for waves for telegraphy and telephony commercial purposes, improvements are needed that will increase the efficiency of modulation in transmitting or receiving.

To obtain this end, I believe interrupters in vacuum will be used to a great extent in the near future. My study and research tends to prove that the air is a good conductor for electricity in wireless frequencies. To my knowledge, all CW interrupters at present are used in the open air. Why not place these interrupters in a vacuum for modulation. A vacuum will offer probably more resistance to the conduction of electricity in wireless frequencies than any other known medium.

If a Goldschmidt tone wheel is placed in a highly evacuated container, and connected in the transmitting antennae circuit, then CW could be cut up at the rate of 1000 times per second or more. This would give a musical sound in a telephone receiver when used with any damped wave detector. Could also better be distinguished from static, as any method that will cut

up undamped waves after reception will also probably cut up static. This method gives very abrupt modulation and messages should carry further.

Also an ordinary relay can be used in a highly evacuated container, having in series with the electro-magnets a buzzer or howler, and a local source of electrical energy. This causes the relay armature to vibrate in phase with the armature of the buzzer, the antennae circuit being in series with the relay armature. Very abrupt modulations are transmitted to the antennae circuit.

This principle can also be applied to the transmission of wireless telephony, by using a transmitter button with a highly evacuated chamber, or a solid back type of transmitter can be placed in an evacuated container and operated by electro-magnetic means, such as from another telephone transmitter exterior to the transmitter in vacuum. By this method sparking to a great extent is prevented and the voice modulations are very abrupt and will carry further, thus increasing the distance and audibility of transmission. In using granules for a microphone for low voltages, they should have a high dielectric power, such as bismuth, antimony, silver, carbon, gold, thallium, selenium, tellurium, etc.

In using a microphone for modulation of high frequency currents direct, the granules should have a high fusing value, such as tungsten, tantalum, osmium, iridium, etc. Here, probably, the dielectric power is not of much value.

The vacuum transmitter can be used for either modulating low voltage direct currents or for electric currents of a radio-frequency.

The electrodes in the Goldschmidt tone wheel and relay buzzer should be of a non-electron emitting substance, as far as practical, as substances that emit electrons easily in a liquid, vacuum or gas should not be used, as they would tend to cause sparking even in a vacuum. Electrodes of platinum, platinum-iridium or other similar non-electron emitting substances should be used. The contacts on the tone wheel should be spaced quite a distance apart, to prevent arcing. Also an exterior grounded spark gap should be used to ground the current when tone wheel breaks the aerial circuit.

But when it comes to the best substances to use in microphones as electrodes and granular material we have other laws to follow. I have seemingly discovered why carbon is the most efficient substance to use in microphones when modulating a low voltage current, namely, because of its RELATIVE HIGH RESISTANCE, FUSING AND DIELECTRIC POWER. But when it is desired to use a microphone direct to modulate radio frequencies, then carbon is not a desirable element to use, because it easily emits carbon vapor or electrons, as a transmitter made up with electrodes and granules having a relative high dielectric and non-electron emitting power should give better results, whether in a vacuum or not. I have also discovered that the difference of the resistance of carbon and metals to the conductivity of electricity having a radio-frequency IS VERY LITTLE, IF ANY. In modulating radio-frequencies carbon loses its value as having a relative high resistance. Substances having a high dielectric, fusing and non-electron emitting power disposed in a vacuum should be most efficient. A vacuum will also prevent oxidization of electrodes and granules.

Of course, when interrupters are disposed in a vacuum the heat generated cannot be so easily radiated, but practical art-

(Continued on page 27)

HOW "B" BATTERIES ARE CONSTRUCTED

RECENT increased growth in the use and range of wireless telegraph and wireless telephone equipment is centering the attention of both professional and amateur operators on the mechanics of their outfits. Certain results are secured by amateur operators who are not technically skilled in the whys and wherefores of their equipment, but it is conceded that the normal and above normal results are procured by those who are fully and completely conversant with every mechanical detail of the outfit. Signal success in their wireless telegraph and wireless telephone operation depends upon much more than a mere speaking acquaintanceship with dots and dashes. The best equipment obtainable is none too good, for the greatest results are obtained by harmonious welding of equipment with the human element of control.

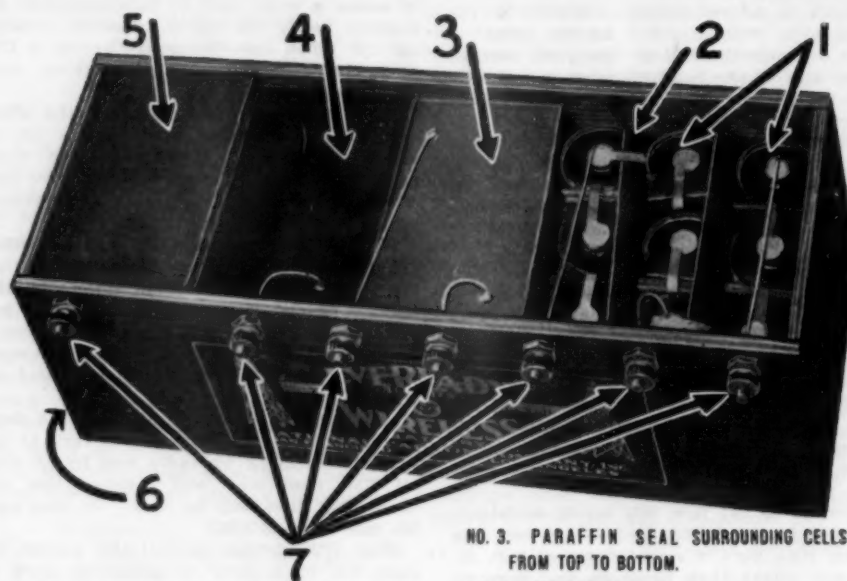
It would be highly advisable if every wireless operator could study first-hand in the factories the actual manufacture of each particular element used in his outfit. Such an opportunity would unquestionably give every operator a broader vision and make him better able to secure the best obtainable results in actual operation. But, since this is neither possible nor practicable, it behooves every operator to learn as much as he possibly can about the actual manufacture of his equipment. Most manufacturers are always glad of the opportunity to explain the methods employed in creating any of their products.

It was entirely natural that the National Carbon Company, Inc., should engage in the manufacture of both dry batteries and wet batteries for wireless telegraph and wireless telephone uses. Having been one of the pioneers in the manufacture of these two types of batteries, it required only an adaptation of their principles to the needs and requirements of this class of equipment.

An exhaustive study of the battery needs of the wireless telegraph and telephone was made, covering a period of some two years.

In the construction of Eveready batteries the manufacturers believe that they have developed a plan of interior construction that possesses many advantages, particularly as applied to those who are concerned in radio activities, either for pleasure or profit. Because of superior insulation these batteries are demonstrating remarkable ability under a wide range of climatic conditions and variations in temperatures. The importance of this particular feature of Eveready batteries is apparent to all, but more so to those who have wrestled with equipment in far-away and inaccessible places.

Construction of the No. 774 Eveready B Battery is shown in the accompanying illustration. The same general principles are followed in the manufacture of all Eveready Dry batteries for radio equipment. A study of their construction will show the extent to which the manufacturers go in securing complete insulation which extends all the way through the battery from the insulating partition separating individual cells to the paraffine impregnated container, making of the whole a unit impervious to moisture.



NO. 1. ASSEMBLY OF CELL UNITS SEALED AND CONNECTED IN SERIES.

NO. 2. INSULATING PARTITION OF SEPARATE CELLS AND CONNECTIONS.

NO. 3. PARAFFIN SEAL SURROUNDING CELLS FROM TOP TO BOTTOM.

NO. 4. INSULATING BOARD.

NO. 5. TOP SEAL OF HARD WAX.

NO. 6. PARAFFIN IMPREGNATED CONTAINER.

NO. 7. TERMINAL TAPS FOR VARIOUS VOLTAGES.

This is a 43 volt battery particularly well suited to a wide range of wireless uses. It is made up of 27 cells connected in series and allows a range of 18 to 43 volts in steps of $4\frac{1}{2}$ volts. One negative and 6 positive terminals have heavy brass screws and nuts.

No. 766 B Battery contains 15 cells connected in series solidly packed and sealed in paraffine, the top with half an inch of sealing wax rendering the unit absolutely waterproof and able to withstand all climatic variations. It has 1 positive and 1 negative lead and $22\frac{1}{2}$ voltage. This battery has been standardized for use in the United States Navy.

No. 765B Battery is very similar to No. 766, but is made particularly for the use of beginners and those who are mostly experimenting with wireless outfits. It contains 15 cells connected in series and has a voltage of $22\frac{1}{2}$ with 1 negative and 1 positive terminal.

In the No. 746 the public is offered a battery that will produce remarkable amplification. It consists of 72 cells connected in series and delivers 108 volts. It can be used in connection with any of the other Eveready Dry batteries and will greatly increase the radius of either the wireless telegraph or wireless telephone equipment. Although a comparatively new battery, it is being widely and successfully used.

But little need be said with reference to the use of the storage battery, as it is the heart of the wireless equipment as it is the heart of the automobile. The storage battery supplies the current for the filament for the transmitting and receiving tubes and for relays and auxiliary purposes. For

these uses the Eveready No. 6-1G-60 is recommended.

All Eveready batteries are manufactured in the immense plant of the National Carbon Company at San Francisco. There is an advantage in using batteries that are manufactured on this Coast, as the user is generally assured of a fresh battery and one that has not been stored for any length of time or possibly subjected to damage in the long shipment across the continent. It is also a source of rightful pride that the Pacific Coast is now producing a superior quality of batteries and emphasizes the fact that this portion of this great country is rapidly coming to the front as a manufacturing center of great importance and unusual promise.

—Not Advtd.

R. H. McMANN TO HEAD RADIO DEPARTMENT OF FEDERAL TEL. & TEL. CO.

RENVILLE H. McMANN of New York City, who is a member of the Executive Radio Council of the Second District and Secretary of the Radio Club of America, has been appointed manager of the Radio Department of the Federal Telephone and Telegraph Company of Buffalo.

Mr. McMann has been interested in amateur radio for the past twelve years and has had a broad experience in the art from the viewpoint of the amateur.

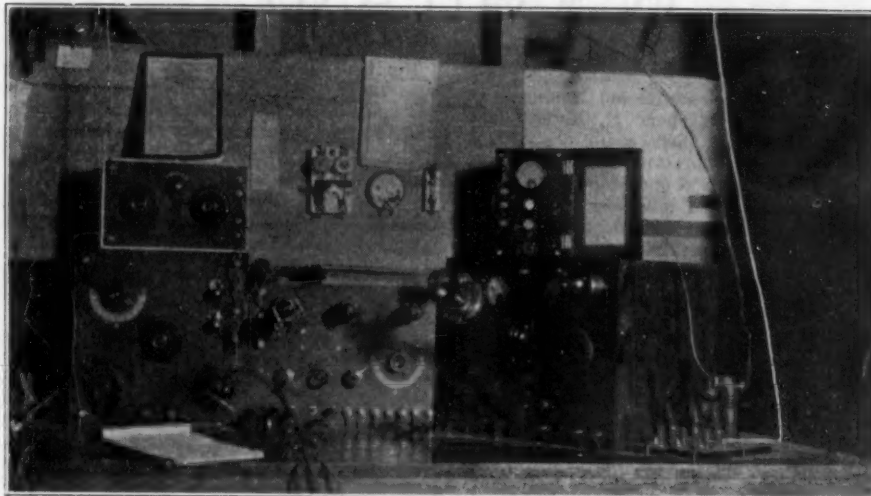
During the war he was in charge of radio telephony on the destroyer U. S. S. "Herresoff" and also for three months had charge of the installation and maintenance of radio telephony at the U. S. Naval Air Station, Cocosolo, Canal Zone.

—Not Advtd.

"PROFESSIONAL AMATEUR" STATIONS

6ALU—LOS ANGELES, CAL.

MR. R. P. MACKENZIE is a firm believer in CW and radio telephone transmission. The accompanying photograph of his station shows something quite out of the ordinary. Considering that the radiation of the phone set, if only half an ampere on 195 meters, it will be of interest to all to learn that 6ALU's voice has been heard by 6AGF and 6ZX. Two power tubes of 5 watt capacity are used, one in the modulating and the other in the oscillating circuit. The plate potential is 375 volts and the tubes draw in the neighborhood of 40 milliamps. 6ALU is at a loss to understand why he has not received any cards from amateurs north of Sacramento, Cal. Has anybody heard him in that part of the state? If so, he would like to have you tell him. The receiving set is of the regenerative type, constructed along the lines of the Grebe CR5 tuner. Mr. Mackenzie is treasurer of the Southern California Radio Association, the largest and most progressive radio club in the southern part of the state.



6ZX-FRESNO, CAL.

HERE we have 6ZX of Walnut Grove, Cal., owned and operated by Mr. J. V. Wise. This is a special amateur station and operates on 375 meters. Mr. Wise sent us the accompanying photo of his station house and aerial and we will now take our readers into our confidence and tell them what's inside of the little white house, although nothing is visible in the photo except the smoke stack. The station house is 8 feet wide and 12 feet long. The transmitter (inside of the house) is adjusted to two wave lengths—200 and 375 meters. The receiving equipment consists of Turney Spider-Web Inductances, Clapp-Eastham condensers, Brandes Navy Type phones and a one-stage amplifier. The antennae to the left of the photo is supported by a 22-foot "V" pole on top of a

35-foot building. This is the antennae used for 200 meter transmission. The high antennae to the right is supported by a tree, whose shadow is seen in the foreground. This antennae is used for 375 meter spark work and also for receiving purposes. The levee in the rear of the station house is the S. P. company's railroad track bed and a power line of 5000 volts is carried on the poles shown in the background. Half way up the picture you can see a set of telephone wires. 6ZX says that his station will never win a popularity contest prize from the phone company. The antennae passes over these wires.

The photo shown herewith was taken from the top of a levee, 100 feet from the station house. This levee is used to keep the Sacramento River from overflowing. 6ZX is located half way between Sacramento and Stockton and Mr. Wise states that he gets more than his share of QRM.



A UNIVERSAL REGENERATIVE RECEIVER

SPECIALLY CONSTRUCTED to detect, regenerate and oscillate on all wavelengths in common use, the receiver shown in the accompanying half-tone is a valuable asset to radio of today. It embodies a self-contained audion control unit, specially constructed automatic plate adjusting device which is controlled by the secondary tuning, gear actuated micrometer secondary adjustment, and other entirely novel features.

The receiver will regenerate freely from wavelengths as low as 175 and as high as 25,000 meters. Large balanced condensers are used for primary and secondary tuning. The inductances are bank-wound and made moisture-proof throughout. A Weston ammeter is provided to indicate the filament current consumption and special potentiometer is used for finely adjusting the plate voltage. This potentiometer is connected between the terminals of the filament battery. The complete receiver is mounted in a walnut cabinet, provided with hinges, to allow interior inspection.

—Not Advt.



Photograph Courtesy of Colin B. Kennedy

2QR AGAIN HEARD IN SCOTLAND

RADIO STATION 2QR, owned and operated by Hugh and Harold Robinson at 13 Walnut street, Keyport, N. J., has just received word that their radio phone had again been heard in Aberdeen, Scotland, and also by a ship's operator in port at Tela, Honduras. The following letter from Mr. James Miller of Aberdeen, Scotland, tells of their again hearing 2QR, which makes a total of four (4) times that letters have been received from Scotland to this effect.

Copy of Letter Received by Station 2QR,
Mr. Hugh Robinson, No. 13, Walnut
Street, Keyport, N. J.

April 5, 1921.

Dear Mr. Robinson:

I have just received your letter and owing to my removing from Mile-End avenue it was delayed. The other letter you sent in January came when I was ill. I sent a letter in reply to that one which you don't seem to have received. I GOT YOU SEVERAL TIMES IN JANUARY AND AT THE BEGINNING OF FEBRUARY, but I had to take my set down and I haven't done anything more at it since, as I am taking the chance to improve it. I'll be ready in about a month to check you up again. I expect I'll hear you much better now and I hope to check you up without any mistakes. I HEARD YOU EVERY TIME LISTENED IN FOR YOU before I took down my set. The only thing was that my tuning was not very selective and other stations jammed me. However, I am improving that and I hope to hear you clearer. You are quite as good on the 275 meter wave as you were on the 600 wave. I'll send the details of your transmissions in a short time, as I haven't my notes here just now, also details of my set and photographs. I have only used three valves during the whole time and my aerial is 80 ft. long double, 40 ft. high, but I'll send you the whole details next mail, and also when I'll be ready to start again. I HOPE TO USE A LOUD SPEAKER AND LET A COMPANY HEAR YOU. I don't know if I'll manage, but I'll try and if I succeed then that will knock the experts' freak theory on the head. I am using an entirely new type of valve, an idea of my own, and I suppose that is the reason of the remarkable results. I WOULD LIKE TO SAY THAT YOUR TRANSMISSIONS ARE REALLY REMARKABLY GOOD. YOUR MODULATIONS ARE EXTREMELY CLEAR. THE CARRIER WAVE IS REALLY THE WEAKEST IN COMPARISON TO THE SPEECH THAT I HAVE HEARD. YOU REALLY GET REMARKABLE RESULTS. I am writing this on the train, so I hope you will be able to make it out, but I want it to catch this mail so as to let you have it as soon as possible.

Hoping to hear from you soon, and also hope to hear you speaking.

I remain, yours sincerely,

(Signed) JAMES MILLER.

Please note change of address.

Care Mrs. Barnett, 48 Albury Road, Aberdeen, Scotland.

It will be noticed that Mr. Miller states he expects to use a loud speaking horn in further tests, which indicates he is receiving 2QR very clearly. This will also allow witnesses to actually verify his reception of 2QR'S transmission.

Further details from the ship's operator who heard 2QR'S radio phone while in port at Tela, Honduras, are now on the way and he has advised that both voice and music were received very clearly.

Other record-breaking distances as given by radio stations in twenty-one states, Canada, and at sea, are given in the following list:

Radio Stations Who Have Heard Station 2QR Radio Phone Working

Cities—	Miles
Bolivar, N. Y.	350
Bristol, Conn.	110
Buffalo, N. Y.	400
Ashland, Ohio	650
Dover, Ohio	650
Napanee, Ontario	400
Mokane, Mo.	1,200
Peterculter, Scotland	3,500
Burlington, Vt.	300
Chelmsford Center, Mass.	225
York, Neb.	1,400
Elmira, N. Y.	250
Jamestown, N. Y.	500
Utica, N. Y.	300
Southbridge, Mass.	190
Shamokin, Pa.	190
Olean, N. Y.	340
Monessen, Pa.	450
St. Louis, Mo.	1,052
Rockville, Ind.	862
Dunmore, Pa.	132
Canton, Ill.	975
Twin Lakes, Conn.	108
Bangor, Maine	570
Niagara Falls, N. Y.	380
Old Forge, N. Y.	185
Kalamazoo, Mich.	815
Fargo, N. D.	1,650
Williamstown, Mass.	180
Syracuse, N. Y.	275
Elizabeth City, N. C.	450
Youngstown, Ohio	600
Geneva, Ohio	530
Boone, Iowa	1,245
Kitchener, Ontario	600
Condersport, Pa.	400
Connellsville, Pa.	415
Niles, Ohio	500
Niagara Falls, Ontario	400
Hagerstown, Md.	130
Washington, Pa.	425
New London, Ohio	630
Penacook, N. H.	225
Leominster, Mass.	240
Manchester, N. H.	225
Cleveland, Ohio	550
Salem, Ohio	500
Flint, Mich.	650
Pittsburg, Pa.	425
Houma, La.	1,250
Detroit, Mich.	700
Canton, Ohio	540
Guelph, Ontario	450
Wilmington, N. C.	645
Boston, Mass.	250
Steamship Kansas	1,500
Blackstone, Va.	300
Casey, Ill.	925
Wadesboro, N. C.	465
Fort Wayne, Ind.	760
Rochester, N. Y.	450
Nashua, N. H.	300
Franklin, Pa.	400
Richmond, Ky.	725
Rock Island, Ill.	1,100
Farmington, Mass.	250
Wilmington, Del.	125

By States—

New York	Maine
Connecticut	Michigan
Ohio	North Dakota
Missouri	North Carolina
Vermont	Iowa
Massachusetts	Maryland
Nebraska	New Hampshire
Pennsylvania	Louisiana
Indiana	Virginia
Illinois	Kentucky
	New Jersey

Also Canada, Scotland (Peterculter), Honduras (Tela), on Atlantic Ocean (1,500 miles).

Practically all of these distances are records which have never before been equaled by any radio phone of the small size and power used by 2QR, and many of the distances exceed those made by even the most powerful radio phone outfits in the United States.

It is interesting to note that Mr. Robinson's radio phone uses only four (4) five watt transmitting tubes, which are the smallest made, and takes its power from an ordinary light socket using less current than an ordinary electric lamp. The whole outfit weighs less than seventy-five pounds and takes up a space approximately the size of that required for an ordinary typewriter.

These recent letters practically remove all doubt as to the genuineness of 2QR being heard in Scotland and the letters from other stations at various distances over 1,200 to 2,900 miles give further evidence to the fact that Mr. Robinson's radio phone is actually reaching remarkable and hitherto considered impossible distances considering the smallness of his outfit.

Mr. Robinson is carrying on his experiments with a view of being heard in every state in the Union, and judging from the above results, this will not be long.

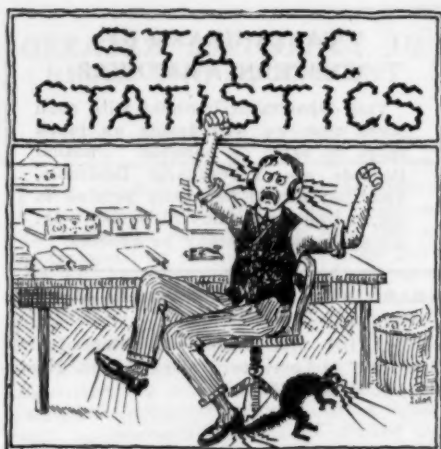
VACUUM TUBES PROTECTED WITH NEW DEVICE

THE painful experience of burning out vacuum tubes is eliminated by a new protective device, the RADECO SAFETY FUSE, recently placed on the market. Several of these new type fuses were received by the publishers of "Pacific Radio News" and were given the usual laboratory test. It was impossible to burn out a tube fitted with the new protective device. The fuses are made in several sizes, varying in amperage carrying capacity according to the type of tube in use. The smallest size will blow when more than three-quarters amperage is drawn by the tube. Other sizes will carry 1, 1½, 1¾, 2 and 2½ amperes, respectively.

A novel feature of the fuse is the method employed to adapt it to the tube base itself. The little fuses slip directly into the prongs of the vacuum tube base and thereby an external method of fusing the filament circuit is made unnecessary.

The Radio Equipment Company of Boston, Mass., deserves the congratulations of all tube users in giving them a device that will save a goodly portion of the "running expenses" of a radio station.

—Advt.



By Squawk McGuff

There has been much discussion as to low and high notes, namely, as to breaking through the QRN of the summer months. The writer finds that during his long distance work that the high note is the most steady and much easier to pick out through the infernal cracking of Jupe Pluvius. From the south, 6EA comes roaring in with a high pitched note that sounds like a piccolo with the croup. 6KP has a low note and comes in very good, it is true, but the fading is very bad and at times he goes clear out, while the high note remains more steady. But I will say that while on his peak 6KP knocks 'em for a row of sliced navy beans. From the north we



Squawk McGuff

have 7DA with a falsetto, or high note (a sharp). He is practically the only "seven" that makes noise to 6APH. Of course we hear other seven stations but like 6KP they can't stand up under the terrific onslaught of Jack Dempsey Static.

Now, boys, I do not wish to enter into controversy over this problem. You have my version of the thing as I see it. Just put it down for what you think it's worth and let it go at that.

Following is a list compiled by 6APH of stations worked during the Static Season. Quite a little fete in itself:

(6LC) (6DD) (6QR) (6AV) (6EN) (6DP) (6OW) (6ZU) (6ZX) (6OH) (6KM) (7YA) (7DA) (6ADL) (6KA) (6FH) (6ACR) (6ZC) (6GP) (6ZA) 7RX (7HN) 6FT (6IC) (6KS) 7ZM (6HH) 7ZA (7DJ) (7HF) (6IM) (6AY) (6WH) (6KP) (6DS) (6IY)

Loudest and most steady DX stations heard are: 6EA, 7DA, 6KP and 7YA.

I run across Engineer McNamee of the Moorhead Company. His brainy brow was wrinkled. He appeared in the throes of the utmost dejection.

"Whassamatahyou, Mac?" says I. "Burn out another fifty watt tube?"

"Well, not exactly, but someone has been reporting our concerts nightly by telephone until he has about got my angorical goat-amia." (Them's big words like engineers use. I don't know what they mean myself.)

"Well, that's strange. Very strange, indeed," says I (making off as how I am a collegiate graduate and understand big words).

"Yes, you see this unisolated categorical son of a bifurcated parallelipigon has been undermining his rhomboidal cranial stuffing with a concatenated collection of crystallized zirconium, which is to say, he has been extemporaneously improvising bum connections on a galena detector. What he needs is a good big fat dose of hexamethylenetetramine. If I had a chance I'd soak him myself with

a slug of diethylsulfonmethylethylthane every night before the show starts. Then maybe he'd condescend to reduce himself to a state of innocuous desuetude, not to say hebetude, or, at least, to lay off and go to sleep." (And when I woke up it was raining.)

LOS ANGELES SECTION

There is a fellow who I know That always says with a sigh If you can hear him why not me And my answer to that is HI.

Now that the new rules of the club are out, all a fellow has to do is read them and abide by the dictum (whatever that is). But in case he can't read he can have his grandmother write for permission to send on the air at a given time and place. They have someone to attend to such matters just as soon as he can find time. Of course time is long but it seems short for all they have to do—pole falling and all.

When it gets noisy around about the call 6AQT it is assumed the interest in radio among the femininity will be greatly accelerated. Some are wondering if it is really a (cutie) as the letters would imply. It is not known as yet whether the bunch will rush to Hollywood singly or in great numbers. Anyway, the position of 6AQT is a precarious one, any way you figure. (If I thought my correspondent wasn't kidding, I'd make a trip down myself.)

There is someone in Los Angeles called "J.D." Wonder if those are his initials or just his official call. Heard he called New Jersey one night but the latter, on account of a bad cold, couldn't answer. J.D.'s wife would have been mad anyhow because Jersey sounds feminine.

If "EB" and "AB" and "IK" should set up a second hand store they surely would get all the "beezeness" and still want more.

Arno has moved to a new location, 1045 South Bixel Street. He is waiting for his old friends to visit him and join with the new ones in the game of buying and selling.

A serious catastrophe befell one, namely, 6LC, when his transformer decided to have a smoke. It (the transformer) was rushed madly to the garbage can section of the property where a vicious stream of water put an end to its hilarity. Also its usefulness. But the loss was covered by insurance, in that, 6LC has an auxiliary stock of number twenty wire. MORAL: Beware of remote control.

About the busiest man in this radio business is the gent hunting news for this column. In fact he is so busy that if he was to pass away he wouldn't have time to lay down. Then again he has so much news he can't use it all. Mostly from a connivance to get pictures in print accrued from an idea someone has a swell station.

6ZR, who, while in Burlingame, was running a close race with Roy Gardner and the Turkish war for first page honors, has moved his limelight to Los Angeles. And I pity Los Angeles as far as the radio clientele are involved. You might as well put out the shingle "Radio Set For Sale" because you won't get a chance to use it anyhow when he opens up. He makes more noise than the blowing up of the "Maine."

A certain party claims that a message he sent was lost en transit. Says it puts him in mind of San Francisco to New York by airplane, 42 hours flying time or two months and three days elapsed time. He further affirms that the message must have went into a "tail spin" between 6KA and 5ZA. Maybe so, maybe so.

Mr. Lambert was of the old school. A little nip was his golden rule. So late one night upon the table He thought he saw a familiar label "Aha, my wife sleeps," he cried As he made a leap, high and wide, He gulped it down in one big swig And then began a terrific jig That would produce vociferous flattery. It was acid for Bessey's battery.

Speaking of commercial operators, that reminds me of "Terrible" Happy Fabian of the "Wicked Watch Chain." If none of you have cast your eyes upon this wonderful linked specimen, do so, by all means, at the first opportunity. You will not need a blueprint to find it. You see the chain before you see Happy. You wonder where the chain is going with Happy and judging from the size of the chain my curiosity is

aroused as to the size of the "turnip." It must be a terrific piece of gigantism. But Happy always was a bear for conspicuousness. Years ago on the "City of Para" he was assigned. He bought up some gold braid and made himself a nifty uniform. Naughty but nifty. Now, in those days gold braid was drawing considerable water. The only man rating gold braid being the Captain exclusively. But that meant nothing in Happy's young life. With a fifteen-cent cigar, of which he smokes oodles and oodles, Happy went to the dining room, along with his gold braid. Everything went lovely until the "Old Man" appeared for his victuals. Well—I won't need to delve further on the spontaneous combustion that followed. Just sing it to the tune of: "And Happy Ain't Wearing Gold Braid Any More, tum tee, tum tum."

Goofy McGlue will now sing, "Have you examined the brake lining on your rotary," accompanied by Dinty Moore quartet.

Boys, our worries are many. Absolutely numerous. Just as soon as KET gets off of 200 meters someone has to come along that's a little more QSA. KFS, the Federal beach station, is now in operation and open for business. However it is needless to announce this, as the first night he came in so neat on 200 that everybody knew it. My advice is that KFS need not send out more QST's that he is now open, as everyone that has a receiving set knows it from 200 up. Oh please, Mr. KFS, have a heart and try to confine yourself to 600 meters. We won't attempt to speculate on what would happen if we radiated on 600. Heavens, no!!

6XAF, Mr. Best, listens in three times a week between 8 and 9 p. m. and when he hears 6APH working he removes the cap from the mica diaphragms on his fones and applies the concoction from the diaphragms to his face for a MASSAGE. This method of vibratory massaging is beneficial on account of the high frequency. The result being a vibratory violet ray effect. Those coming in contact with Mr. Best kindly take note of his ruddy complexion.

NORTHWEST BRIEFS

According to all reports, things have been more or less stagnant during the past few weeks, possibly on account of the hot weather. The banquet in Portland, however, was a howling success and everyone enjoyed themselves with a relish that would indicate other banquets are in contemplation. There were 125 or more present. This number not only comprising the district in and around Portland, but as far north as Tacoma and Seattle. Five members were present from Seattle and twenty from Tacoma. One feature of the banquet was the up-to-snuff method two members used in transporting themselves from Camp Lewis. They came via airplane.

The Secretary of the state of Washington made a special trip to Portland in order to be present, his object being to bring up the suggestion that amateurs broadcast the description of stolen automobiles.

7JW, Mr. Tait, paid me a visit recently and I was much impressed with his report of the doings in and around Portland, Tacoma and Seattle. I certainly take off my hat to this worthy disciple of the "air" clientele and if he is an example of that progressive spirit in which the northwest seems to be imbued, I must remark that as far as enterprise is concerned, there is no better.

Miss Winnifred Dow, a leading figure in radio at Tacoma, was present at the banquet and her smiling visage was an inspiration for many. In fact, a great deal of credit goes to all of the ladies. However, I am forced to say that 7ZB was a little unobserving as to the other ladies present. His traveling mind seemingly had centered in and around the Tacoma delegation. If there should be a banquet in Tacoma soon I am speculating as to the method 7ZB would use for transportation. Surely not by airplane. That would not be fast enough. Somebody's dance card would look like this: "7ZB first dance, 7ZB second dance. All dances reserved for 7ZB."

A movement is on foot to amalgamate the clubs of the Northwest. This was met with great favor at the banquet, and the machinery of details and plans will be put in motion shortly. It is planned to have a yearly convention at which each branch will be represented. It will probably be incorporated under the title of the Northwestern Radio Association.

Phone Kearny 2778

PACIFIC RADIO SCHOOL

ARC & SPARK SYSTEMS

Hours:

1 to 5 P. M.

7 to 9 P. M.

433 Call Bldg.,
San Francisco, Cal.

Send for descriptive circular.

Northern Radio CompanyHAS OPENED IT'S
Seattle CW Radio Store

We carry practically all of the standard makes of apparatus, we sell them at the standard advertised prices, f.o.b. Seattle, and we give speedy, dependable, mail order service.

We are specialists in CW, and will shortly have one of the most complete stocks of CW apparatus on the Pacific Coast.

WE ARE INSTALLING A RADIO TELEPHONE FOR BROADCASTING PURPOSES WHICH WILL BE HEARD FROM ALASKA TO CALIFORNIA.

Our complete catalogue, containing diagrams, formulas, and the latest CW and telephone data, will be ready for distribution at an early date. A stamp will put you on our mailing list, but quick action will be necessary—as the issue is limited.

SPECIAL:

The first of the NORTHRAD CW line:

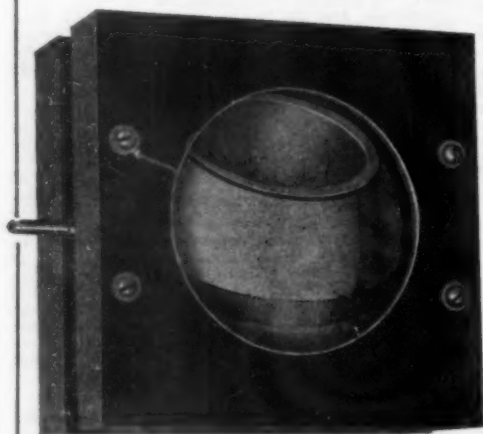
CW transmitting condenser, fixed variable, .00025 to .00075 mfd., mica-copper foil, Bakelite mounting.

A dependable, accurately rated, and efficient unit—tested to 2000 volts—absolutely guaranteed.

PRICE 60c POSTPAID

NORTHERN RADIO COMPANY

418 UNION STREET - - SEATTLE, WASH.

JUST THE THING

— For —
**C. W.
AND WIRELESS
PHONE RECEPTION**

Type V-1 \$5⁵⁰
VariometersType V-1 \$4²⁵
Variocouplers

We pay all postage charges
DEALERS—WRITE US FOR PROPOSITION

McGUIRE RADIO LABORATORY

Manufacturers of Radio Apparatus

1855 Church St.

San Francisco, Calif.

**CALLS HEARD BY
WESTERN AMATEURS**

This department has met with such favor that we will devote as much space to same as possible. Unusual Records are Particularly Desirable. Your list should be neatly printed in ink, using one side of paper only. All errors will thereby be avoided.

**HEARD AT KMT, LIBBYVILLE, ALASKA
May 29, 1921**

6EX, 7BK, 6IM, 6AGF. Location of station KMT is Latitude 59 deg. 35 min. North Longitude 157 West.

The correct address of Mr. A. B. Lopez is 720 Santa Barbara St., Santa Barbara, Cal.

Station 6DS is located at Alhambra, Cal., instead of Alameda, Cal., as previously listed.

**HEARD AND WORKED BY 6DS
ALHAMBRA, CALIF.**

5XD, 5YA, 5ZA, (6AE), 6AH, 6AI, (6AK), 6AN, (6AR), 6ADA, 6AAK, (6AAW), (6ABW), (6ACR), (6AGF), (6AIW), (6ANK), 6BB, 6CO, 6CP, (6DP), (6EX), 6FH, 6FI, 6FX, 6GE, (6HC), 6HH, 6HP, (6IC), 6IM, 6JJ, 6JI, 6JN, 6JR, 6JT, 6KC, 6KL, 6KM, 6MZ, DAY LIGHT, 6NH, 6OC, 6OH, 6OT, 6OW, (6PR), 6QR, 6QS, 6TC (6TV), 6TX, 6VM, 6VX, 6XZ, (6XAD), 6ZA, 6ZB, 6ZE, 6ZH, 6ZK, 6ZM, 6ZO 6ZR, (6ZU), 6ZX, 6ZY, (6ZZ), 6ZAA, 7AC, 7CU, 7IN, 7YA, 7ZJ, 9LR.

**CALLS HEARD AT 6FB
REDONDO BEACH, CALIF.**

May 17—June 10, 1921

6AL, 6AM, 6BJ, 6FH, 6HC, 6HP, 6IC, 6IM, 6JM, 6KC, 6KM, 6MX, 6MZ, 6TF, 6TV, 6VX, 6WG, 6WN, 6XN, 6YA, 6ZO, 6ZU, 6ZZ, 6AAH, 6AFQ, 6AFU, 6AFY, 6AGF, 6AGP, 6AIH, 6AIW, 6APH, 6XAD, 7HF, 7MF.

**CALLS HEARD AT 7MF
EUGENE, OREGON**

(6AE), 6AK, 6AR, 6AL, 6AZ, 6BP, 6DD, 6DP, 6DX, 6EA, 6EB, 6EL, 6FH, 6HE, 6IC, 6IF, 6IM, 6IW, 6IY (CW), 6KM, 6LR, 6LU, 6LW, 6LX, 6NB, 6OC, 6OH, 6OW, 6PN, 6QR, 6TV 6WZ, 6XW, 6ZA, 6ZU, 6ZR, 6ZX, 6ABM, 6AFN, (6AGF), (6AIW), (6AMW), (6ARK), 7AC, 7AD, 7AX, 7BA, 7BC, 7BH, 7BK, 7BQ, 7CB, 7CU, 7CW, 7DA, 7ED, 7FH, 7FI, 7FL, (7GA), 7GY, 7ID, 7IM, 7IN, 7GW, (7KB), 7KM, (7LD), 7LJ, 7LR, 7MW, 7NN, 7NX, 7OT, (7PH), 7QY, 9LR, 9XI (CW), 6BA, 5IF, 5ZA, 5EL.

**CALLS HEARD AT RADIO STATION 7HN
May 1 to June 10**

6AE, 6AK, 6AR, 6AT, 6AV, 6BR, 6BW, 6CH, 6ED, 6EN, 6EV, 6EX, 6FE, 6FT, 6HC, 6HP, 6IV, 6JR, (6KL), 6KM, 6KS, 6LD, 6MZ, 6NG, 6OH, 6PR, 6QR, 6QU, 6SC, 6TU, 6TV, 6VX, 6ZK, 6ZR, 6ZU, 6ZX, 6AAI, 6AAR, 6AAU, 6ADW, (6ABM), 6ABX, 6ACM, 6ADS, 6AFM, 6AFN, 6AFU, 6AGF, 6AID, 6AIU, 6AIW, 6AMW, 6APH, 6ARE, CW STATIONS 6AAT, 6ANJ, 7BC, 7BK, 7BQ, 7CA, 7CB, (7CE), 7DA, 7ED, (7FI), 7ID, 7IC, 7IN, 7IG, 7KM, 7KQ, 7LR, 7NL, 7NN, 7XD, 7ZD, 7ZJ.

GREATER EFFICIENCY IN RECEIVING EQUIPMENT

By Colin B. Kennedy
President, The Colin B. Kennedy Co.

THE writer has always held the opinion that the development of radio receiving equipment has not kept pace with that of the transmitting end. We have high powered transmitting stations developed to a high degree of perfection, but have not taken full advantage of the energy being brought to the receiving board.

This explains why the company of which the writer is a member has sought to specialize almost exclusively on receiving equipment, as representing the field offering the greatest latitude for constructive effort. The success attending its efforts in this direction is attributable simply to painstaking work in the development of designs calculated to give maximum effectiveness. In so doing it has made free use of the accepted and proven principles of radio engineering, and has not permitted the bugaboo of cost to swerve it toward less efficient expedients.

All circuits used in Kennedy receivers are electro magnetically coupled, this being the best known method for obtaining selectivity. This principle is fully recognized by manufacturers of high grade apparatus for commercial and military purposes, and the technical considerations are brought out and emphasized by the Bureau of Standards in various publications.*

A well defined though weak signal on a silent background is much more easily read than one of greater intensity in the presence of interference. The measured audibility of a signal is, for this reason, very de-

SCHEDULE OF CW TRAFFIC—SIXTH RADIO DISTRICT

By LAWRENCE MOTT, Associate Editor

(Note: Stations interested in the reception of CW may listen at the times noted, on the wave of the station listed. It is urgently requested that all operators copying the CW traffic schedule QSL the same direct to the transmitting station. Transmitting stations are politely requested to report success and work accomplished to me at Avalon, Catalina Island, California, on or before the 8th of each month in order that their efforts may be tabulated and appear in the following number of Pacific Radio News.—Associate Editor.)

Time*	Station	Wave-length	Time*	Station	Wave-length	Time*	Station	Wave-length
9:00	6XAD	240 & 375	9:45	6ALU	200	10:30	6HK	200
9:05	6PI	200	9:50	6EF	200	10:35	6ZB	375
9:10	6EN	200	9:55	6IT	200	10:40	7ZI	...
9:15	6WU	200	10:00	6CU	200	10:45	6IY	200
9:20	6JE	200	10:05	6XN	...	10:50	6ZE	375
9:25	6MK	200	10:10	6XD	...	10:55	6ZX	...
9:30	6ALE	200	10:15	6AQA	200	11:00	5ZA	375
9:35	6KA	200	10:20	6KP	200			
9:40	6HU	200	10:25	6BA	200			

All other CW operators who wish to join in this arrangement will please notify me as soon as practicable.

*Owing to a press of other matter, in summer evenings, 6XAD may not find it possible to be on every night.

ceiving, and it will be found that one showing greatest strength on an audibility meter is very often the most difficult to read on account of accompanying interference. This shows the importance of adopting means whereby the ratio of signal strength to interference is increased and is best accomplished by reducing electro static coupling and providing means for the proper control of electro magnetic coupling. The writer has been able at noon in San Francisco, for example, to copy complete messages from Atlantic Coast stations, using a small antenna suspended from an automobile with the frame of the car as a counterpoise ground, and a standard receiver without amplifiers.

The diminution of energy losses in receiving circuits is highly important on account of the minute quantities involved. This is largely a mechanical problem and the solution lies in adopting designs which tend to eliminate interaction between circuits and

preventing absorption of energy by unused resonant sections.

The rapidly increasing use of continuous wave transmission at the higher frequencies, as in voice transmission, has created a demand for receivers of greater flexibility. This requirement has been anticipated and met in the newer types of apparatus manufactured by the Colin B. Kennedy Co., in which provision has been made for complete control of regeneration with resulting voice reception remarkably free from distortion.

The present day amateur and experimenter is demanding, more than ever before, apparatus embodying the above mentioned principles as a means for obtaining greater efficiency. This is a source of great satisfaction to the writer, who has always made a plea for quality in radio apparatus.

*For example, see page 45, Bureau of Standards, Bulletin 4, Radio Instruments and Measurements.

—Not Advtd.

SPIDER WEBS-



Cut Shows Front Panel Removed

Exclusive Westinghouse Agents for our Territory

are now manufactured on a large enough scale to have the price

REDUCED TO

lower than originally. A complete regenerative set, the equal of any, for only

\$5.50
Plus 30c Postage

The New 3000 Meter Set Will Be Out Soon

Distributed Exclusively in the West through

HERROLD LABORATORIES

"Everything for the Amateur"

467 SO. FIRST STREET

SAN JOSE, CALIF.

Announcement

We are pleased to announce to our many satisfied customers that in addition to continuing our Mail Order Service which has made a wonderful record for SPEED, we have recently put on the market the "PUGET" products, a combination of the best engineering, designing and high-grade workmanship. This line includes:

Puget High Voltage Transformer, Puget Variometers
Puget Vacuum Tube Panels, Puget Transmitting Condenser
Puget Protective Devices, Puget Amplifier Sets
Puget Short Wave Regenerative Sets
and Others

Nothing but High-Grade Apparatus Carries the name "PUGET"

Send for price list. Order anything from our list and receive it by return mail.

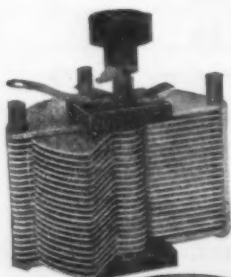
Northwest Radio Service Co.

609 Fourth Avenue

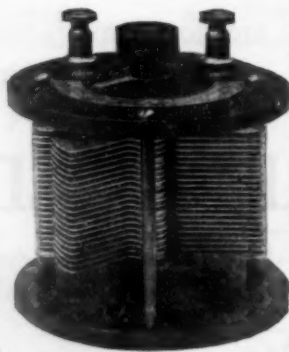
SEATTLE

WASHINGTON

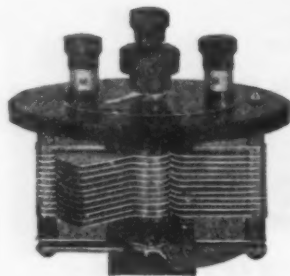
"ILLINOIS" THE RELIABLE MADE RIGHT - STAYS RIGHT



STYLE No. 1.



STYLE No. 2.



VERNIER

Three Styles; No. 1, Panel; No. 2, Open Type as shown; No. 3, Fully Encased. Anti Profeeter. Less than pre-war prices. Fully assembled and tested.

	Style No.1	No.2	No.3
67 Plates,	\$7.00	\$8.00	\$8.50
43 "	3.50	4.50	4.75
23 "	2.75	3.75	4.00
13 "	2.25	3.25	3.50

Money back if not satisfied. Just return condenser within 10 days by Insured Parcel Post.

With Style No. 1, we will, if desired, furnish 3 inch Metal Dial with large Knob, instead of Scale and Pointer. Extra Price 75 cents. Or we will, if desired, supply the Condenser with smooth 3-16 inch center staff, without Scale, Knob and Pointer, at 15 cents off the list to those who prefer to supply their own dial.

Vernier with single movable plate applied to 13, 23 or 43 plate condenser, \$3.00 extra.

We allow no discounts except 5 per cent on orders of 6 or more.

Sent Prepaid on Receipt of Price

Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada add 25c.

Foreign Orders other than Canada not solicited.

G. F. JOHNSON, 625 Black Ave., Springfield, Illinois

A HARD BOILED BUNCH

(Continued from page 11)

giant cannon, an' the wind shook the shack till I half expected her to go off into the bay. Just when the gale was at its worst, I sees a little gray dory comin', divin' through the seas. In a few minutes it was in the shelter of the cove.

"It's Hell-Fire," says Dopey, who'd been tryin' to help me with the engine. The storm-king makes his boat fast alongside the dory wharf, an' comes up to the shack.

He was a big six-foot savage, an' looked like a first-class pirate, with his red mackinaw, corduroys, highcut musher boots, an' a black fur cap. He had a big gun in his belt under his mackinaw, an' walked like he was ready to start a battle on a second's notice.

"Fine weather," he grunts, rubbin' the frozen salt crust off his face onto the sleeve of his mackinaw, which was runnin' with sea water. "I hope it holds on till I get back to Popoff."

When I tells him about the engine trouble he goes into the power room, an' glares at the one-lunger.

"Buckin' again, eh!" he snarls, in a voice so hard-boiled it makes the engine look kind'a green an' sick. He squirts a little primin' in the cups, whips out a few special cuss words, punches a couple levers, an' kicks the flywheel—an' the engine begins hummin' like a Pierce-Arrow.

After I'd cleared with N-P-R, we sit by the coal heater in the operatin' room an' chewed the rag.

"Today is my twenty-eighth birthday," I remarks. "An' if some fortune teller had ever told me that on this day I was goin' to be sittin' in a shack on a sea-washed rock up in Alaska among the crowd of gun-powder maniacs, I'd a told her she was crazy."

"You say today's your birthday," exclaims Hell-Fire.

"Yes," I answers, which was the foolishest thing I ever done in my life.

"Then you gotta make a dance in th' hall tonight," he declares. "I'll go out an' tell th' gang, an' we'll make things ready."

I protests strong against that, but he tells me it's got to be done.

"To make a birthday dance is the oldest custom in the Saumagin Islands," he insists. "If you don't, they'll think you're stuck up—they'll come up here an' shoot th' shack t' splinters."

I'd seen all the shootin' I wanted already, so that night we have the dance—an' it was a dance I'll not forget. The dance hall, which was perfectly round an' about fifty feet in diameter, had once been a cyanide tank in the gold mine up the bay. It'd been roofed over, windows put in the walls, had a big coal heater on one side, an' a bench runnin' all around the wall. It was all decorated up with paper bells an' truck, an' was lighted by a single big coal oil lamp hangin' from the ceilin'.

But if the dance hall was wild an' woolly, the dancers were wilder an' woollier. Evenin' dress was mackinaw coats, rubber boots an' shootin' artillery. The women was mostly Aleute breeds, an' all sat on one side of the hall, with the men on the other. The orchestra was a leather-lunged accordion an' a mistuned guitar, while the style of dancin' was rag, dip, shimmy or anythin' you please. The fishermen were half full of brew, an' among them I notices Mexican Frank, watchin' me with a kind'a evil eye.

Before the dancin' had been proceedin' more'n two hours, there'd been four flat fights an' a dozen cursin' matches.

"It's a pretty good dance, but it's too blame slow," grumbles Hell-Fire, about 10

(Continued on page 24)

If It's a Radiophone—It's a deForest Invention

RADIOPHONE

REG. U.S. PAT. OFF.

Be Sure It's the deForest Design of Wireless



No discarded apparatus.

To increase the range add a panel.

FOUR PANEL STATION

Complete set of four units mounted vertically.

- (1) Complete radio "Midget" transmitter. Phone sending range 30 miles (OF-3).
- (2) Complete short wave tuner, 150 to 600 meters (MT-100).
- (3) Complete audion control, especially for gaseous tubes (MP-100).
- (4) Complete one-step amplifier (MP-200).
- (5) Any additional step of amplification may be added.

It is better to be sure first than sorry afterwards.

The deForest "Interpanel" system is for amateur and commercial CW telegraph and telephone stations. It is the one design absolutely necessary to get full success of CW transmission, made possible by Dr. deForest's invention of the audion.

Each panel is only 9 inches high.

Each panel mounts a **complete** apparatus.

Each panel gives the exact space best suited to all parts.

Panels may be combined in any relative positions.

Get the "Interpanel Idea." Send for Catalogue 88

De Forest Radio Tel. & Tel. Co., 1415 Sedgwick Ave., New York City

Inventors, Licensors and Manufacturers of Highest Grade Radio Apparatus.

Pacific Coast Distributors: Henry M. Shaw, Pacific Radio Supplies Co., 638 Mission St., SAN FRANCISCO, CAL.

NORTHWESTERN RADIO

A Superior Line of Receiving Apparatus



A detector and two stage amplifier that will give you results. This instrument is in use in many stations in the Northwest and its performance is a proven fact. You must see and use this set to appreciate its value. Material and workmanship are the best.

Specifications — Panel quarter inch grade XX bakelite dilecto. Gorton pantograph engraving. Oak Cabinet finished in flemish oak.

Knobs and dials are machined from sheet bakelite and turn TRUE. All socket supports are constructed of bakelite and cast aluminum.

Write for Catalog

Detector and two stage amplifier Type SR-2.
Size of panel 10½x12¾. Complete less tubes and battery \$70 f.o.b., Portland.

NORTHWESTERN RADIO MANUFACTURING CO.

1556 East Taylor Street

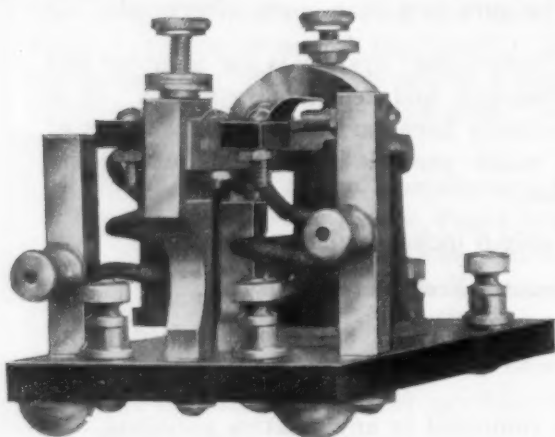
Portland, Oregon

In writing to advertisers, please mention this Journal

**BREAK!
BREAK!
BREAK!**

Send and receive at the same time with this new Break-in System.

Hear the other fellow while you are sending and "QRT" until he is through



The peace-maker of the air

NO MORE REPEATS

This instrument should be in every station. Why repeat over and over again because the other fellow can't get you thru the "QRM"? Just as soon as somebody "busts you up," you can hear him while you are sending. If the other fellow has "QRM," he can tell you while you are sending and you can "QRT" until he finishes.

NO BOTHERSOME SWITCH TO THROW

Every time you press the key the aerial and ground circuits are connected to the transmitter and the receiver is short-circuited. Every time you release the key the aerial and ground circuits are automatically connected to the receiver.

USE IT WITH YOUR BUG OR COOTIE KEY

By merely connecting a Morse Key, Bug or Cootie Key to two binding posts on the base of this instrument, you can send at any desired speed without fear of having the contacts stick.

WORKS ON 3 VOLTS

Only two dry cells are needed to operate this instrument. Two large contacts, sufficient to carry one kilowatt, automatically break the transformer primary circuit with every touch of the key.

RUGGED CONSTRUCTION THROUGHOUT

The entire instrument is mounted on a heavy Bakelite base, fitted with soft rubber feet. Eight binding posts are provided for connections. All brass parts highly nickel-plated. Here you have an automatic aerial switch and main key to break the transformer current all in one instrument—all working in one operation. The price is less than that asked for a good aerial switch alone. Think of the convenience of not having to throw a big switch. Think of the time and trouble you save by eliminating repeats.

SPECIAL INTRODUCTORY PRICE OF THIS RELAY FOR AUGUST

Prepaid to any part of the U. S. Full directions for operating and complete wiring diagram given with each instrument. All orders filled immediately—No delays.

ORDER YOUR BREAK-KEY TODAY

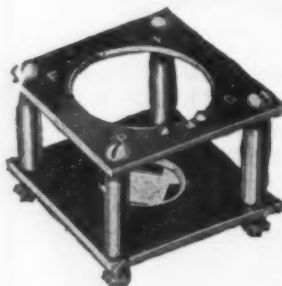
Watch for our next month's ad on another time and money-saving device.

We have a few JEWELL Zero to Five Ammeters (A. C.) for your power circuit that we are selling for \$4.00. Regular price of these Ammeters is \$8.00. Postage 25 cents.

WESTERN WIRELESS WORKS
5534 EDGERLY ST. OAKLAND, CALIF.

Something New

Made to Please You and
Priced to please your
pocketbook



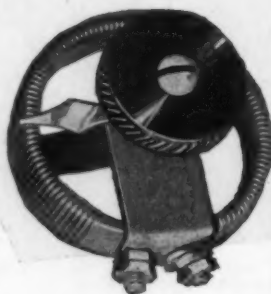
Type 126, Tube Socket

By departing from conventional design in audion sockets we have combined the advantages of all the disadvantages of none and a price lower than any. Think of it—a sturdy easily mounted socket that is heat proof, has bakelite-dilecto insulation, handy binding posts, etc., all for 75c.

And here's a smooth running rheostat that takes panel space 2 inches in diameter, needs one hole to mount, has six ohm resistance, all off and all on positions and a brass panel bushing. Priced at 90c.

Price **75c**

Postpaid **The Wilcox Laboratories**
Lansing Dept. J. Michigan



Type 122 Rheostat

Price **90c**

Postpaid

A HARD BOILED BUNCH

(Continued from page 22)

o'clock. "I wish somebody'd start somethin' an' put a little life in things round here."

I feels pretty uneasy after this, but things goes along fairly peaceful, until at last some addle-brained boob hollers out, "Ladies choice," an' right then was where I gets in trouble. I'd been keepin' carefully away from Mexican Frank's wife all evenin', but now what does she do but come straight over an' chooses me for her partner. Everybody was pretty well tanked up with the sourdough brew, an' the rough-neck orchestra tore off a wild an' woolly one-step that got faster an' crazier, until at last when the finale arrives with a grand smash of mad music, the fiery-eyed breed-girl, gone crazy with dancin' an' moonshine, throws her arms plumb around my neck an' plasters a red-hot kiss right on my lips.

The next instant, I sees a cannon spoutin' fire in Mexican Frank's flat, an' a speedy bullet clips a groove through my hair, which must'a been standin' straight on end.

"Whoopla! Hurrah!" howls Hell-Fire, joyously, producin' his forty-five centimeter howitzer an' blazin' away at the lamp. He puts it out first shot, an' then there started the blastedest pandemonious of fightin' an' howlin' an' cursin' an' shootin' you ever could imagine. It beat the roughest Tom Mix movin' picture ever made by forty times, with guns spittin' fire in th' dark an' everybody millin' an' stampin' like a crowd of wild bulls.

Seein' a gleam of light, I makes for it, an' dives through a window, landin' in a puddle of mud an' slush outside. It was still rainin' an' blowin' an' dark as pitch, but I scrambles along the bank to my shack in about five seconds, an' gets the old gasoline mill goin'. Sittin' in, I calls C-Q a couple times, but don't raise nobody. I hears the crowd of gun-fightin' maniacs yellin' an' shootin' out among the shacks, an' comin' closer all the time. Gettin' desperate, I opens up full power an' pounds out distress signals—which I figgers I was justified in doin' under them circumstances.

"S-O-S, S-O-S, S-O-S, de K-V-I, K-V-I, K-V-I," I hammers out, slow an' heavy.

Listenin', I hears a jerky little spark start up an' call:

"K-V-I, K-V-I, de N-R-X, N-R-X; this is the revenue cutter 'Unalga,' twenty miles west Unga—what's the matter? Is Unga Island sinkin'?"

"No, but it ought to," I pounds back. "Th' shootin' iron artists are havin' a grand killin' campaign, an' I'm leavin' th' island instantaneously—please ask th' skipper if he'll come by an' pick me up."

The kid on the cutter tells me to Q-R-X; but in a minute he comes back again.

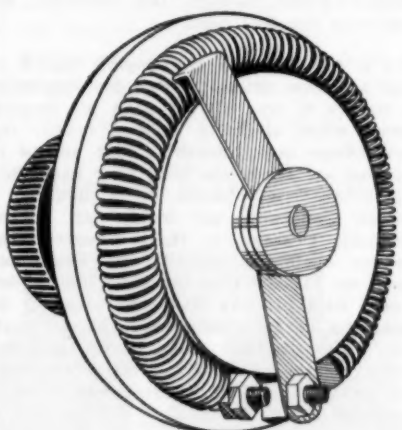
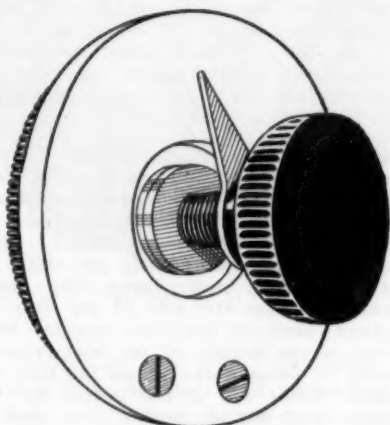
"Sorry, O-M," he says, "but the skipper says he wouldn't come near that cursed Unga Island f'r all the love in heaven or all th' money in Rome—hope you come out all right."

"Yes, I'll come out with more holes 'n a colander, if I stay here—" I hesitates as a bullet splits a panel in the door, an' another one drifts clear through an' knocks the lid-lifter off the stove. "Tell your skipper I'm drivin' straight to sea in a fishin' dory, an' ask him for th' love of Peter to come an' pick me up."

I stops to listen, but about that time another bullet ploughs into my desk, maybe two inches from the key-knob; then still another one comes, sput! right into my audion-bulb, an' a piece of flyin' glass gives me a bad gash in the chin—you see th' scar's here yet.

(Continued on page 26)

SHRAMCO - REO -



For your power tube--

New type Shramco Reo, No. 90P.
1.5 ohm Nichrome resistance.

Current capacity 6 amperes.
Price \$2.00, 1 lb. postage.

A BACK MOUNTED panel rheostat, specially designed for the Radiotron U.V. 202 and other transmitting tubes. Resistance element (1.5 ohm) is "Nichrome" wire, mounted on a solid block of asbestos. Allows unusually accurate and delicate variation of the filament current. All metal parts brass. Spring phosphor bronze blade. Base 3 in. Overall height 2½ in. Handsomely finished and accompanied by an unconditional guarantee of complete satisfaction. Get the most out of your expensive power tube by using a good rheostat. Order a Shramco Reo today! Now ready for immediate shipment.

For your vt Detector

and amplifier, use the original Shramco Reo, type 90. "Nichrome" resistance of 6 ohms. Price, \$2.00 plus postage for 1 lb. We also make the "Midget" Shramco Reo, 5 ohms resistance, 2½ in. base.

SHOTTON RADIO MFG. COMPANY

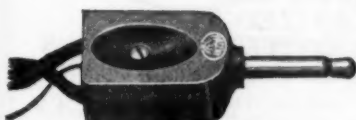
P. O. BOX 3, SCRANTON, PA.

Catalogue "K" listing a complete line of high grade parts at reasonable prices, sent to any reader of Pacific Radio News for five cents in stamps.

Pacent Universal Plug



"SERVIMUS"



PRICE \$2.00

THE ONLY PLUG FOR RADIO NO CONNECTIONS TO SOLDER CONNECTED IN A JIFFY ESSENTIAL FOR MODERN RADIO FOR TRANSMISSION AND RECEPTION APPROVED BY THE NAVY DEPARTMENT USED BY COMMERCIAL COMPANIES ENDORSED BY FOREMOST AMATEURS OBTAINABLE FROM YOUR DEALER

OF UNIVERSAL RADIO USE

We shall be pleased to send you bulletins describing the above and our other products on receipt of five cents in stamps.

AMATEURS AND EXPERIMENTERS—Get in touch with your dealer.

DEALERS—Send for our Proposition.

SOLE DISTRIBUTORS FOR

Wicony's Complete Line of "Eventual" Apparatus

Duo-Lateral Coils
Standard VT Batteries

Pacent Universal Plugs
Dubilier Condensers

Sullivan Apparatus
Selbt Condensers

Special Distributors for Brandes Phones

PACENT ELECTRIC COMPANY, Inc.

150 Nassau Street

Louis Gerard Pacent, President
Telephone Beekman 5810

New York City

Dubilier Universal Condenser



PRICE \$2.00

SUPPLIED IN MOST USED CAPACITIES FROM .01 TO .00025 MFD. FOR TRANSMISSION AND RECEPTION ESPECIALLY DESIGNED FOR C. W. WILL CARRY ONE AMPERE AT 1000 VOLTS RUGGEDLY CONSTRUCTED HAS CONSTANT CAPACITY APPROVED BY OUR GOVERNMENT EASILY MOUNTED ANYWHERE

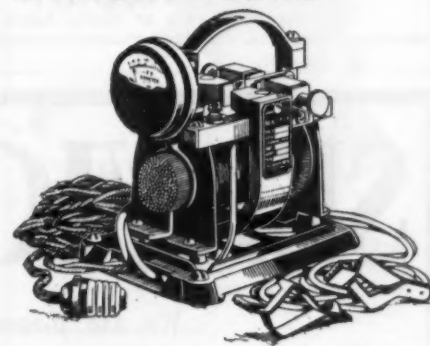
10c CHARGES YOUR BATTERY AT HOME F-F BATTERY BOOSTER WITH AN

and your Wireless Station will never be closed because of a discharged battery. Is it not gratifying to feel that your filament battery will always be ready when you want it and that you will never have to give up in disgust when working a distant station? A Storage Battery kept fully charged lasts longer and everything depending upon it works better, which is the secret of perfect battery service, and a Booster insures this. Do not run the risk of ruining an expensive battery, for it costs less to buy a BOOSTER than to be without one. The F-F Battery Booster is a Charging Apparatus, unfailing in its ability to deliver service day and night, is rugged and foolproof and requires no skill to operate. They charge automatically and operate unattended. Screw the Plug into a lamp socket, snap clips on battery terminals and watch the gravity come up. The Ammeter shows you just the amount of current flowing. Easily renewable and adjustable carbon electrodes rectify the current and last for thousands of hours. Everything is complete in one compact, self-contained and portable unit. The F-F Battery Booster is a Magnetic Rectifier for 105 to 125 Volt 60 Cycle Alternating Currents. The New Models are:

Bantam Type 6 charges 6 Volt Battery, at 6 Amperes	\$15
Type 16 charges 6 Volt Battery, at 8 Amperes	\$24
Type 166 charges 6 Volt Battery, at 12 Amperes	\$32
Bantam Type 12 charges 12 Volt Battery at 5 Amperes	\$15
Type 112 charges 12 Volt Battery, at 6 Amperes	\$24
Type 1612 charges 12 Volt Battery, at 7 Amperes	\$32
Type 1626 Combination Type charges both 6 Volt and 12 Volt Batteries at 12 and 7 Amperes	\$48

The larger ampere capacity Types are recommended for the larger batteries, or where time is limited. Shipping Weights Complete with AMMETER and BATTERY CLIPS, 11 to 15 pounds. Order from your Dealer, or send check for prompt Express Shipment. If via Parcel Post have remittance include Postage and Insurance Charges, or have us ship C. O. D.

WIRELESS OPERATORS, EXPERIMENTERS, CAR OWNERS, STORAGE BATTERY USERS



SERVICE STATION CHARGING
SERVICE AT ANY LAMP SOCKET

Other F-F Battery Boosters charge batteries from Farm Lighting Plants, Direct Current Circuits and Direct Current Generators. If not ready to order now, write today for Free Descriptive BOOSTER Bulletin No. 33.

BATTERY CHARGING STATIONS and GARAGES Use Our Large F-F ROTARY RECTIFIERS for Group Charging. Real Economy in first cost and in service. Charges up to 36 cells. Full Wave, Automatic, Dependable. It will also Rectify High Voltage. If the 110 Volt Primary of a high voltage transformer is connected to the Direct Current side of the F-F Rotary Rectifier, the secondary will deliver high voltage Uni-directional current suitable for Radio Work.

Write today for Descriptive ROTARY Bulletin No. 33A, which gives full information, or mail Check with Order.

THE FRANCE MFG. CO.
Gen. Offices & Works, Cleveland, Ohio, U.S.A.

Canadian Representative: Battery Service & Sales Company, Hamilton, Ontario, Canada.

BAKELITE-DILECTO

The standard insulating material for all radio work. Water-proof, permanent, strong, used by all important manufacturers of wireless apparatus and others requiring the utmost in insulation.

Furnished in sheets, rods and tubes.

We also manufacture VULCANIZED FIBRE in sheets, rods and tubes and CONITE, a special insulation, in sheets or rolls from .005" to .020" thick.

Let us show you how our standard products can be made to solve your insulation problems.

THE CONTINENTAL FIBRE CO.

NEWARK, DELAWARE

233 Broadway, New York City

332 S. Michigan Ave., Chicago, Ill.

525 Market St., San Francisco, Cal.

411 S. Main St., Los Angeles, Cal.

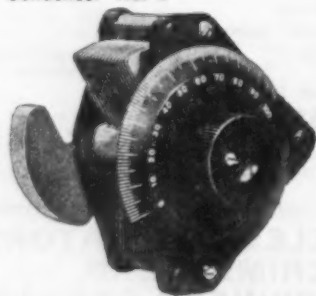
301 Fifth Ave., Pittsburg, Pa.

1710 Royal Bank Bldg., Cor. King and Yonge Sts., Toronto, Ontario, Canada

CHELSEA Variable Condensers

Condenser No. 3

(Die-Cast Type)



No.	Capacity	Type	Size	Weight	Lbs.	Price
2	.0011 m. f.	Mounted	4 1/4 x 4 1/4 x 3 1/4	1 1/4		\$5.00
2	.0006 m. f.	Mounted	4 1/4 x 4 1/4 x 2 1/4	1 1/4		4.50
3	.0011 m. f.	With Dial	4 1/4 x 3 x 4	2		4.75
3	.0011 m. f.	Without Dial	4 1/4 x 3 x 4	2		4.35
4	.0006 m. f.	With Dial	4 1/4 x 3 x 3 1/4	1 1/4		4.25
4	.0006 m. f.	Without Dial	4 1/4 x 3 x 3 1/4	1 1/4		3.85

Top, bottom and knob are genuine bakelite, shaft of steel running in bronze bearings, adjustable tension on movable plates, large bakelite dial reading in hundredths, high capacity, amply separated and accurately spaced plates.

Unmounted types will fit any panel and are equipped with counterweight.

Purchase from your dealer; if he does not carry it, send to us.

Bulletin upon request.

CHELSEA RADIO COMPANY

13 FIFTH STREET CHELSEA, MASS.
Manufacturers of Radio Apparatus and Moulders of Bakelite

SERVICE NORTH! SOUTH!

We are pleased to announce
the Opening of our New Store
at LOS ANGELES, CALIF.

Have you sent for your copy of our 200-page radio manual? It is a complete catalog of the latest and best radio equipment you can purchase anywhere. It will help you purchase the best equipment at lowest prices—and it comes to you for only 35 cents in stamps. This amount will be refunded to you with your first \$1.50 purchase from us.

LEO J.
MEYBERG
CO.

The largest and
most complete stock
of Radio Apparatus
on the Pacific Coast.

LOS ANGELES
752 So. Los Angeles St.

SAN FRANCISCO
428 Market St.

A HARD BOILED BUNCH (Continued from page 24)

Abandonin' the shack, I gets out in the rain again, an' half tumbles down the hill to the dory wharf. Climbin' into one of the dories I was somewhat acquainted with, I lets go the painter an' starts the little engine in the stern. As I dashes out into the storm there comes a rattle of heavy artillery from up on the rocks, an' a few minutes later I hears about twenty-five power dories comin' poppin' out into the bay after me, full of crazy codfishermen, still whoopin' an' shootin'.

Gettin' out into Nagai Straits, I drives straight to sea through the sleet an' rain. The fishermen seemed to get more speed out of their dories than I could out of mine, for they kept gainin' on me. Their bullets come whistlin' closer an' closer all the time, untill pretty soon they began plunkin' against the side of my dory. I huddles down in the fishy-smellin' bilge water in the bottom of the boat, steerin' mostly by guess work; an' all the time the codfish dories was gettin' nearer an' the bullets was hittin' harder. At last a whistler bores through the bulkhead an' punctures the fuel tank.

In a few minutes the engine begins to miss an' slow down. I was just beginnin' to believe it was all off with Sir Samuel Jones, when all of a sudden, crash! the dory bangs into somethin' that staves in the bow an' sends me head over heels into the ocean. My hands come against a smooth iron wall, an' lookin' up in the darkness, I sees I'm right alongside the revenue cutter "Unalga." The crew had heard me hit, an' they lowers a line, which I gets hold of. As they haul me up on deck, the cutter's searchlight starts sputterin', an' somebody turns it out onto the crowd in the pursuin' dories, who were still shootin'. In the nearest one, I could recognize Mexican Frank.

"Come back an' fighta like a man, you coward!" he howls, wavin' a smokin' high-power cannon in one fist an' some kind of a big gleamin' carvin' knife in the other. "Come back, damma you, an' I shoota you so full of lead you seenka to the bottom withouta ballast!"

"Let's get away from this god-forsaken island," mutters the skipper of the "Unalga," an' he rings the engine telegraph up to full ahead.

Half an hour later the cutter's code-slinger hunts me up with a message.

"It was routed to K-V-I, but I told N-P-R you were here, and I took it for you," he explains, handin' it to me. As I unfolds it, I sees it's all the way from Frisco, an' addressed to myself.

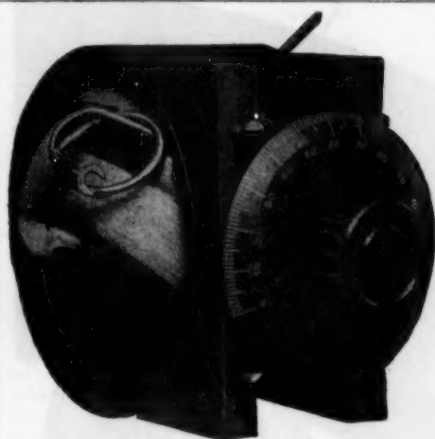
"Samuel Jones, Unga Island, Alaska—

With best wishes for a happy birthday; the gang and myself join in hoping you are enjoying the acme of peace and quiet at Unga.—Cunningham."

"Amen!" I mutters, as the "Unalga" hooks up to a fourteen knot clip, an' heads out to sea.

ARE YOU INTERESTED IN C.W.?

If so, write at once to our Associate Editor, Mr. Lawrence Mott, Avalon, Catalina Island, Cal., and have him arrange a calling schedule for your station. Further details of the C.W. Club's progress will appear in our next issue.

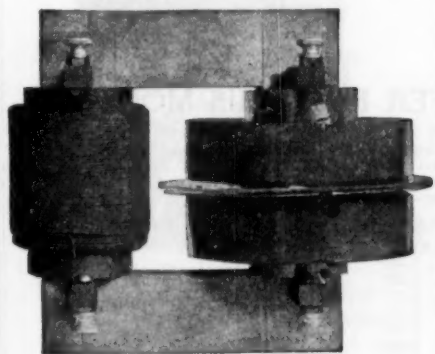


TYPE Z. R. V.

Variometer has unit construction with bakelite shell and hardwood ball. Has low dielectric losses and a range of inductance of 1.25 mil henry maxim to .1 mil henry minimum. Is readily used on table or mounted on panels.

Complete with 3-inch dial and knob\$6.50

Without dial or knob.....\$5.75



TYPE Z. R. L.

Transformer for use with rotary spark gap has two section secondary, bakelite terminal supports and high grade construction, 400 watts power rating highly efficient at 200 meters.

Price\$14.00

Apparatus which excels in those qualities which for 13 years of continuous manufacture have maintained its enviable reputation for reliability will be found pre-eminent in the display rooms of discriminating dealers and is manufactured by

CLAPP-EASTHAM COMPANY

140 Main St., Cambridge, Mass.

Catalogs mailed for 6c stamps

Receive Wireless Telephone Concerts in Your Own Home

PICK up radio phone concerts, tune signals, ship, shore and amateur stations, right in your own home —with an ABC receiving UNIT. Simple to operate —no license, battery or special knowledge needed. Price of Unit alone, \$24.90. Phone, aerial, all equipment to complete station included in ABC "Completion Package" for \$74.90.

Send 10 cents for your 16-page booklet, "How I Put Up a Complete Radio Station in 2 Hours," an actual story that you can duplicate. Request Booklet.

Wireless Equipment Co. Inc.
Newark, New Jersey

ABC UNITS
Standardized Radio Sectional Receiving Units

INTERRUPTERS IN VACUUM (Continued from page 15)

ficial means may be used to cool the device, such as by radiating fins, cold air or liquids. Interrupters in a vacuum cannot probably handle as heavy currents as where they are used in open air, but for smaller currents they should be far more efficient. One way to overcome this would be to connect a plurality of interrupters in multiple.

Above interrupters can be disposed in the antennae, primary or secondary circuits for interruption either at the transmitting or receiving station of undamped waves to audio-frequency groups.

The evacuated microphone could also be used as a howler and disposed in the antennae circuit for telegraphy modulation of CW.

Above discoveries, if they prove to be correct, open up new fields of research and study which seems unlimited.

The Northwest Radio Service Co., 609 Fourth Ave., Seattle, Wash., which entered the amateur field only a little over a year ago, has grown into one of the leading retail firms on the coast, it now maintaining the largest stock of radio material in the Northwest. In addition to retailing apparatus of all leading makes, it has recently entered the manufacturing field on an extensive scale. The apparatus turned out by this company has been appropriately named "PUGET" products, and has already met with a very favorable reception by the amateur trade. The PUGET line includes the Puget Transformer, Oscillation Transformer, Transmitting Condenser, Variometers, Short Wave Regenerative Sets, and many other items.

—Not Advt.

U. S. NAVY GETS FIGHT RETURNS TO HONOLULU IN ELEVEN MINUTES

Only eleven minutes and fourteen seconds after the knockout of Carpenter by Dempsey, the Honolulu papers had in their hands a press dispatch from the U. S. Naval Radio Service. The dispatch was carried on the special leased US wire and transmitted by NPG to NPM.



THE—

Vocaloud

THE IDEAL loud-speaker. Requires no batteries, no adjustments, no extra equipment whatever. Just hook Vocaloud on to your receiving apparatus and get your signals QSA all over your house! Your order shipped at once.

Station Type, \$30.00

(In mahogany cabinet, as shown)

Laboratory Type, \$25.00

(Mounted on solid metal base)



CORWIN'S Improved SWITCH

MANY SWITCHES give their manufacturers more profit,—none give their users more satisfaction. Try a Corwin Switch. As good as it looks!

Brass shaft is moulded right in to the moulded knob. It can never come loose. All metal parts nickel-plated brass. Contact radius 1 3/4 inches. 90 cents—5c Postage.

NEW RADISCO VARIO-COUPLER

Accurate to the .002 part of an inch. Moulded base, Formica tube, all metal parts brass.

\$7.50 Postpaid

Corwin's 1921 catalog contains 32 pages of Corwin, Radisco, and other good instruments. You'll find it lists a good instrument for every part of your station at prices that don't "take the joy out of life". Send for your copy today. 10 cents.

A. H. CORWIN & COMPANY

Dept. G6. 4 West Park St., Newark, N.J.

RADIOTRON U.V. 201
An
exceptional amplifier
PRICE \$6⁵⁰

RADIOTRON U.V. 200
The
long distance detector
PRICE \$5⁰⁰

**Introducing
Model U.V. 712**

RADIOTRON UV 200 Gas Content Detector Tube. The DX stations are using them for that "long distance" reception. Have your friend bring his Radiotron to your station and compare it with the tube you are using; then send to your dealer for a Radiotron.

PRICE 5.00

RADIOTRON UV 201 High Vacuum Amplifier Tube. The amplifier that amplifies. The kind that gives musical signals—not musical squeal. Eliminate what you think is static but what really is nothing more than tube noises. Do this by sending to your dealer for a Radiotron UV 201.

PRICE \$6.50

RADIOTRON UV 712 Intervalve Transformer incorporates certain features of construction and gives an overall efficiency not yet approached by any other type. It is a device of superior workmanship and it is not to be confounded with Intervalve Transformers designed only to be sold at a cheap price. The ratio of windings on the UV 712 Transformer is 9 to 1, a ratio found in no other instrument on the amateur market. Watch 'em copy it. The original only costs \$7.00. Why buy an imitation?

GRID LEAKS are essential to get proper bias on tubes, whether they be detector or amplifier. The potential maintained on the grid is computed by Ohm's Law and it is therefore equal to the grid current times the grid resistance. With a grid resistance of two megohms and a grid current of one microampere the bias negative potential will be two volts. A grid Leak mounting and six different values of grid leak units (changeable) costs but \$5.00—the benefit derived therefrom will more than pay you.

ARE YOU SATISFIED

With D-L-&W (Delay, Linger and Wait) Service? Or are you using TRTS (The Real Time Savers) Service? If we cannot supply you from stock and cannot get it immediately for you, you hear from us as soon as a letter can get to you. Isn't that enough to satisfy you? Try TRTS service and weep no more.

Get the Habit. Get TRTS Service

If your dealer does not stock Radiotron apparatus do not take something "just as good"—demand Radiotron. Request him to forward your order direct.

THE RADIO TELEPHONE SHOP

Agents for Radiotron Apparatus in Utah, Nevada, New Mexico, Arizona, California, Oregon and Washington.

175 STEUART STREET, SAN FRANCISCO, CALIF.

DEALERS: WRITE FOR OUR INTERESTING PROPOSITION

SPECIAL OFFER FOR THIS MONTH

No. 14 Hard Drawn Copper Wire (aerial wire), approximately 80 feet to the pound, 47½¢ per lb. (This offer is open to let you get acquainted with TRTS service. If you are contemplating putting up a new aerial, or adding to the one you already have, order now—today!)

DE FOREST HONEYCOMB COILS—NEW PRICES

DL 25.....	\$1.50	DL 300.....	\$2.20
DL 35.....	1.55	DL 400.....	2.40
DL 50.....	1.60	DL 500.....	2.55
DL 75.....	1.70	DL 600.....	2.80
DL 100.....	1.80	DL 750.....	3.00
DL 150.....	1.90	DL 1000.....	3.20
DL 200.....	2.00	DL 1250.....	3.55
DL 250.....	2.10	DL 1500.....	3.80

Pen Brand Grid Condensers.....	\$0.65
Pen Brand Series-Parallel Switch.....	1.00

ADD-A STEP—UNITS

Pen Brand Detector Unit.....	\$7.75
Pen Brand Amplifier RADIOTRON UV 712 Amplifier Transformer.....	17.50

HORNS HORNS HORNS HORNS HORNS HORNS
PAPIER MACHE HORNS—No distortion, but a clear, sharp signal. Use your own phones with them. While they last\$5.00

FORMICA PANELS

2-16 in. thick, 2½¢ per square in. We cut panels to exact size and smooth off edges. For polishing, add 75¢ per square foot. Minimum charge 75¢. Panels drilled to your specifications, \$1.00 per panel.

METERS

3 in. flush type, INSULATED CASES. While they last only.	
500 Volt DC meter	\$14.00
100 Mil-amp. meter	6.50
300 Mil-amp. meter	6.50
500 Mil-amp. meter	6.50

THE MAGNETIC AMPLIFIER

(Continued from page 9)

sections, each occupying a portion of a single fibre spool, which completely filled the space allotted between the walls of the cylinders. Taps from this winding were taken out thru the "washers." The details of this winding are not unlike those of any other simple form of solenoid and will not be considered here.

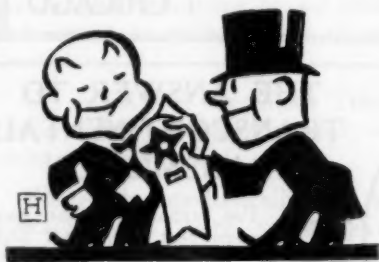
The radio-frequency winding was made of a special transmitting "Litz," capable of carrying 100 amperes without undue heating. Eight turns were provided and taps were taken off at each turn as shown in Fig. 12.

The artificial cooling of such a device as this is a matter of importance, as no small amount of heat is generated—this resulting primarily from eddy currents in the iron.

It was planned originally to cool the apparatus by forcing air thru the inner cylinder, but this method was soon doomed to failure in the initial tests. It was found necessary to immerse the whole apparatus in oil and to cool the oil by means of water circulation.

Preliminary tests of this apparatus, using 60 cycle alternating current in the radio frequency winding, were made to provide data for checking the design. Figs 9, 10 and 11 show the results of these tests graphically. It is interesting to note the increase in control as the ampere turns in

(Continued on page 30)



With some dealers, service is largely a matter of convenience—now it means one thing and later on another thing.

From near and far comes proper recognition that KELLY & PHILLIPS is more than a name. Amateurs everywhere are beginning to realize that it stands for a superior, dependable service: that it always means the same things—quick delivery, quality goods, and prompt and careful attention to even the smallest detail.

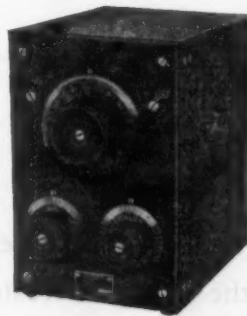
A trial will convince you.

Anything and everything in radio advertised in this magazine.

Radio Department

KELLY & PHILLIPS

312 Flatbush Ave., Brooklyn, New York



Westinghouse Radio Equipment

Westinghouse Radio Equipment embodies the latest ideas in receiving equipment, providing a most efficient set for telegraph and telephone reception over the amateur and normal ship wave-length ranges. Type R. A. Short Wave tuner, Style 307189, responds to a wave-length of 180 to 700 meters and is especially selective.

Type D. A. detector-amplifier, style 307190, combines a vacuum tube detector with a two-stage amplifier. Both units are mounted on Micarta panels attached to a polish mahogany cabinet. Simple in design—easy to operate—single-tuning circuit. Highly efficient.

PRICES

Type R. A.
Tuner
\$85.00

Type D. A. Detector-
Amplifier
\$85.00

Type R. C. Combination of first two units mounted in single cabinet \$125.00

Bulletin 14 sent on request to any reader of the Pacific Radio News.

ATLANTIC RADIO COMPANY

Incorporated

88 Broad Street
Boston 9, Mass.

Branch, 15 Temple Street
Portland, Maine

Your Receiving Coil Problems Solved



TYPE 226
4 STEP INDUCTOR

Here is a coil of low distributed capacity, wide wave-length range, and which requires no auxiliary mounting.

Only four sizes required to cover all ranges from 150 to 22,000 meters using a .001 M.F. condenser.

Coupling varied by changing distance between coils.

Adapted for experimental use as well as for permanent installations.

PRICE \$6.00 EACH

Fully described in Bulletin 302C

GENERAL RADIO CO.

Manufacturers of

Electrical and Radio Laboratory Apparatus
CAMBRIDGE 39-MASSACHUSETTS

2119 Whitson St.,
Selma, Calif.,
June 27th, 1921.

Western Radio Electric Co.,
550 South Flower St.,
Los Angeles, Calif.

Dear Sirs:

Last winter I bought some Grebe Apparatus from you. I am so well satisfied with the apparatus and the way you treated me that I just have to tell the other fellows about it too.

Yours truly,

DORN STAMMERS, (Radio 6KX)

ONE OF MANY—AND UN-SOLICITED—WHY SAY MORE?



BURGESS "B" BATTERIES

ARE THE NOISELESS KIND—made with and without taps

Send for catalogue giving sizes and prices

BURGESS BATTERY COMPANY

Harris Trust Bldg.

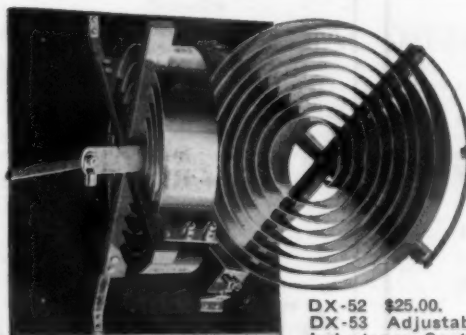
CHICAGO

Fight Returns Reach San Francisco in Record Time

The Pacific Radio Supplies Company and the San Francisco "Call" together "scooped" their competitors in broadcasting radio reports of the big Dempsey-Carpentier fight on July 2nd. Commencing with the initial bulletins describing matters of interest at the ringside prior to the fight, the introduction of distinguished guests, etc., followed by the announcements of the entry into the ring of first Carpentier and then Dempsey, bulletins relating every incident in each round were broadcasted promptly by radiophone not more than one minute after the actual happenings at Jersey City.

The DeForest radiophone set at the California Theater, operated by the Pacific Radio Supplies Co., was connected by special telephone to the local office of the International News Service. A special sounder was connected in at the International News Service office on their special telegraph line to Jersey City. As fast as the reports came in by wire they were telephoned to the California Theater and immediately transmitted by radiophone by the operator in charge, J. W. A. Legge-Willis.

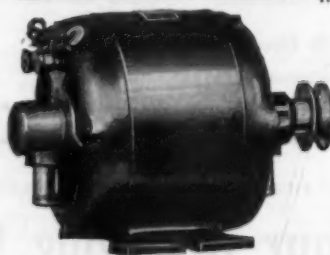
The radiophone service was so rapid and complete that bulletins had actually been given describing the first part of the fourth round before the "flash" came announcing the knockout. Considering the distance involved and the two relays necessary, i. e., from wire telegraph to wire telephone and from wire telephone to radiophone, it is believed that the speed of this service established a record in radio communication.



THE ANSWER TO TRANSCONTINENTAL TRANSMISSION

Use apparatus that has proven best. Ask 6AK and old 6EJ of Walnut Grove, Cal., about 8ZR's signals, or 7ZJ of Vancouver, Wash., and then decide upon the "DX" O. T. and Synchronous motor combination.

DX-52 \$25.00.
DX-53 Adjustable
Inductance Control \$35.00.



Add \$3.50 to list for 25 cycle motors. Prices are F. O. B.

SYNCHRONOUS MOTORS

H. P.		H. P.	
1-15.....	\$28.00	1-5.....	\$42.00
1-12.....	30.00	1-4.....	50.00
1-10.....	32.00	3-8.....	58.00
1-8.....	34.00	1-2.....	75.00
1-6.....	39.00	3-4.....	99.00

1-10 H. P. 3400 R. P. M. Non-synchronous
Induction Motor \$25.00.

THE AMERICAN RADIO SALES AND SERVICE CO.

Great American Bldg. Mansfield, Ohio
Testing Station 8ZR.

THE MAGNETIC AMPLIFIER

(Continued from page 29)

one winding approach the same value as those in the other for the designed value. In Fig. 11, it will be observed that one ampere in the control winding controlled 35 amperes in the other. It is evident from this that the use of the magnetic amplifier, or iron relay, is not limited to the control of high frequency currents. It is a device, the use of which is quite unlimited.

"B" BATTERIES

AN
EVEREADY
PRODUCT

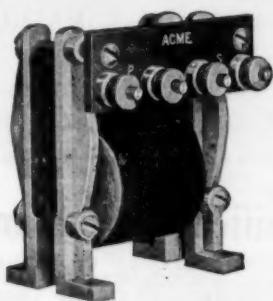
43V. Batteries, tapped.....\$5.00
22½V. Batteries, Commercial Type 250

Latter two types especially adapted to Cunningham and Radiotron Tubes. Postage Prepaid Anywhere in U. S.

Ets - Hokin & Galvan

Wireless Engineers
10 Mission Street San Francisco

ACME AMPLIFYING TRANSFORMER



THE PROPER ratio of turns and impedance, exactly suited to the new VTs is an important feature of the transformer shown above.

Our coils are of the paper wound type, thoroughly impregnated. They are provided with strong flexible leads, and contain no soldering flux of any description.

Get an ACME Amplifying Transformer and your transformer needs are cared for *perpetually!*

Electrically, mechanically and artistically—from every viewpoint an Acme is as good a transformer as can be made. And every instrument is backed by the ACME guarantee.

ACME APPARATUS CO.

182 Massachusetts Ave.
Cambridge, 39, Mass.

*Transformers and radio
engineers and manufacturers*

SPECIAL

Paragon Rheostat and Grid Leak \$1.75
3000 metor loose coupler - 11.00
Please include sufficient postage
DREYFUSS SALES CORP.
179 GREENWICH ST. N Y C.T.

BRASS SWITCH CONTACT POINTS

Size, 7/32x7/32
Price with 1/4-inch screw\$0.20 doz.
Price with shank and brass nut .30 doz.
Price of extra nuts for same... .10 doz.
Add Postage
Order from Ad Satisfaction Guaranteed
Immediate Delivery—Try us
STRATTON ELECTRIC COMPANY
215 Federal St. GREENFIELD, MASS.



PRICE \$7⁵⁰

FOR THIS MONTH ONLY

BALDWIN VARIOCOUPLER

The primary of this variocoupler is wound on XX Bake-lite tube—4 inches in diameter, 14 taps are taken off and by means of 2 sets of switches, a one turn variation of inductance may be obtained.

The shaft is hollow through which flexible leads run which connect to the rotor.

This is a decided advantage over other variocouplers as it does not depend on the bearings for connection.

DAVID KILLOCH COMPANY
57 MURRAY ST. NEW YORK

ANNOUNCING

Opening of the New Salesroom and Laboratory
of

RAY-DI-CO.

—the—

"HOUSE OF BETTER RADIO"

Saturday, August 20, 1921

where a complete line of standard apparatus,
parts and materials will be carried.

To the amateurs we extend a hearty invitation
to call and "get acquainted."

MAIL ORDERS GIVEN PROMPT ATTENTION

RAY-DI-CO

(Ray-Dee-Ko)

1547C N. Wells St. Radio 9AG

Chicago, Ill.

"We'll look for you at the First National Convention,
August 30-September 3, Chicago."

DEALERS

R
KLAUS
D
I
O

Bulletins?

Are you receiving our Trade

KLAUS RADIO CO.

Eureka, Ill.

"The Radio Telegrapher"

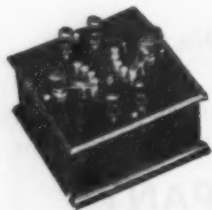
Official Organ
UNITED RADIO TELEGRAPHERS' ASSOCIATION
Room 303
24-26 Stone Street

Read about what's going on among the Commercial, Navy and Army operators

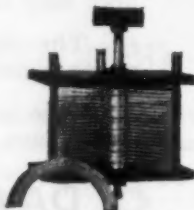
ON SHIPBOARD
AT SHORE STATIONS
AT HOME AND ABROAD

Subscription Price \$1.50 yearly, 15 cents a copy

Our Tuners and condensers brought in the big fight results in great shape. They made a record. C.W. Condensers, for use up to 2000 V. now ready. 24-page catalog. New equipment. Phone, CW and receiving hook-ups now ready. Send 10 cents.



TRESCO
DAVENPORT
IOWA



SATISFACTION!



That's what the STANDARD VT BATTERY is built to give. But to get it you must insist on the genuine STANDARD VT BATTERY, without modification of the name. Refuse and return the substitute.

Type	List Price
No. 7623—Small size	\$1.50
No. 7625—Large size	2.65
No. 7650—Large size Plub—Variable	3.50

Does Your Dealer Sell the Real Standard VT Battery?

RICHTER-SCHOTTLE CO., MFRS.

293 CHURCH STREET

PACENT ELECTRIC CO., Sole Agents

NEW YORK, N. Y.

150 Nassau St., New York City



--RADIO INSTITUTE-- OF AMERICA

Conducted by the greatest and most experienced radio telegraph organization in the world.

Thorough training given in radio operating, traffic, and in damped and undamped systems.

Tuition ten dollars a month for either the day or evening sessions or both combined.

RADIO CORPORATION OF AMERICA

Phone Douglas 3030

331 New Call Bld., San Francisco

ATTENTION YOU SUN- KIST, MOON-HUGGED RADI-O-ITES

I can fill your orders from the largest stock in California and save you both time and transportation charges.

Johnson Pays the Postage
or Express

**ALTADENA RADIO
LABORATORY**

Paul F. Johnson, Owner

ALTADENA CALIFORNIA

Classified Advertisements

ADVERTISEMENTS IN THIS SECTION ARE THREE CENTS PER WORD NET. REMITTANCE, IN FORM OF CURRENCY, MONEY ORDER OR STAMPS, MUST ACCOMPANY ORDER.

RADIO CABINETS—Mahogany or oak finished or unfinished, to your design. Send rough sketch for quotation. Prompt service. Formica cut to size. Radio supplies, parts, etc. Pacific Radio Exchange, 439 Call Bldg., San Francisco, Calif.

SPECIAL machine work, wiring, drilling panels, rebuilding sets, panel polishing, nickel-plated screws and wire. Best of workmanship, best price. Get our price before having your work done. THE RADIO TELEPHONE SHOP, 175 Steuart Street.

BOXES—Quartered oak and mahogany made to your specifications. Your boxes finished in polished mahogany, or old English finish, or finish your own cabinet with TRTS Old English Stain. Easy to apply. Can sufficient to stain several cabinets, 50c. THE RADIO TELEPHONE SHOP, 175 Steuart Street.

DUBILIER CONDENSER. Brand new, never used. Cost \$33.50 in San Francisco. Capacity .007, 19,000 volt secondary rating. Sell for \$29. T. R. BROWN, 3675 20 th St., San Francisco.

YOU should have a copy of Lieut. E. W. Stone's "Elements of Radio-telegraphy," 400 pages of data on all sorts of radio equipment. A valuable book. The price is only \$2.50 per copy, postpaid. Pacific Radio Pub. Co., San Francisco, Cal.

ARC RADIO MANUALS, compiled by the Federal Telegraph engineers of San Francisco. Tells you all you need to know about the 2 and 5 KW arc sets for ship and shore use. Sent to any address for \$2.50 per copy, postpaid. Pacific Radio Pub. Co., San Francisco.

ONE CUNNINGHAM C 300 Detector Bulb. Never used. Sell for \$4. RADIO, 251 Duboce Ave., San Francisco.

UNIT RECEIVING INDUCTANCES assure satisfactory, efficient, and unparalleled long distance reception of all forms of radio transmission. For long wave work our BI-LATTICE COILS (duo-lateral) need no introduction. For short wave reception a set of SINGLE LAYER COILS compares favorably with the best regeneratives; and the cost is but a fraction of the regular regenerative receiver. Send 3c for bulletin. Our prices and service will surprise you. P. J. Stockwell, Box 157-D, Reading, Mass.

Grebe model regenerative receiver and detector unit, used two months; excellent for radiophone music; first money order for \$45.00 gets outfit. Phone \$4.00 extra. W. G. Conger, Independence, Mo.

FOR SALE—Chemical Set. Write for list. 9AZN, 608 So. 4th St., La Crosse, Wis.

When Writing to Advertisers Please Mention this Magazine

SUMMERTIME RADIO

NO NEED FOR YOU TO SHUT UP SHOP WHEN SUMMER COMES, THAT IS, IF YOU OWN A



Licensed
Under the
Original
Armstrong
Patent.



KT-1 PORTABLE

At last here's the outfit that makes Summer radio work a pleasure.

Take it out into the country and send up a few hundred feet of antennae on a Grebe Radio Kite, and surprise yourself at its range.

Find out the range of your home station.

With a canoe or rowboat, you have a ship-station that sails under the power of your kite.

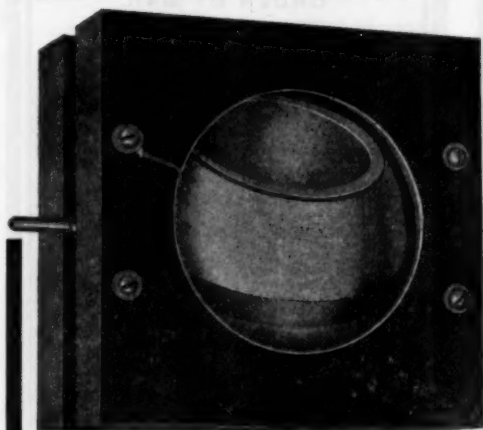
Then, when Winter comes again, merely replace the CR-5 Regenerative Receiver in its cabinet and use it in your station for real results.

See it at your Dealer's today!

Bunnell & Co., J. H., New York City.
Central Radio Co., Inc., Kansas City, Mo.
Continental Radio and Electric Corp., New York.
Detroit Electric Co., Detroit, Mich.
Doubleday-Hill Electric Co., Pittsburgh, Pa.
Electrical Specialty Co., Columbus, Ohio.
Hickson Electric Co., Inc., Rochester, N. Y.
Holt Electric Utilities Co., Jacksonville, Fla.
Nurburt Still Electrical Co., Houston, Texas.

Kelly & Phillips, Brooklyn, N. Y.
Klaus Radio Company, Eureka, Ill.
Manhattan Electrical Supply Co., New York, Chicago, St. Louis.
Leo J. Mayberg Co., San Francisco, Cal.
Newman Stern Co., Cleveland, Ohio
F. D. Pitts Co., Inc., Boston, Mass.
Philadelphia School of Wireless Telegraphy, Philadelphia, Pa.
Western Radio Electric Co., Los Angeles, Cal.

A. H. GREBE & CO., Inc., 73 Van Wyck Blvd., Richmond Hill, N. Y.

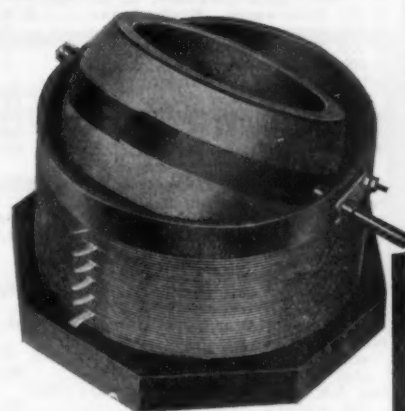


CESCO VARIOMETER

V-100—CESCO Variometer for the grid and plate circuits of short wave regenerative receivers. Correctly designed and carefully constructed of thoroughly seasoned hard maple—cannot and will not warp, shrink, or crack, as soft wood variometers frequently do. All windings bound and insulated with CESCO special impregnating compound. Price, post-paid—\$5.50. Order number V-100.

\$5.50

That you may be sure not to miss this unparalleled opportunity for saving mail your orders at once to



CESCO VARIOCOUPLER

C-100—CESCO Variocoupler for use in connection with CESCO variometer. The secondary is ball type. Primary consists of a threaded tube 4 inches in diameter and 2 inches high, made of unshrinkable composition and wound with large-gauge bare copper wire. An efficient instrument, sturdy and durable. CESCO VARIOCOUPLER complete mounted on hardwood base for panel mounting, retail price—\$4.50. Order number C-100.

\$4.50

This Special for
One Month Only

CALIFORNIA ELECTRIC SUPPLY CO.

643 MISSION STREET, SAN FRANCISCO

This Special for
One Month Only

"Radio Supplies That R Right"

RADIO APPARATUS

Distributors of Reliable Radio Apparatus to Schools, Colleges,
Radio Clubs and Experimenters All Over the World!

"PITTS CO"

Service Fills Orders on
Every Continent! Why
Not Let Us Serve You?



"PITTS CO"

Service Reaches All
Over the World! Why
Not Let It Reach You?

AMPLIFYING TRANSFORMERS
No. UV-712 Radio Corporation, new
type—Just out!\$ 7.00
No. 231-A General Radio, new type 5.00
No. 226-W Federal, mounted..... 7.00

AMPLIFIERS
No. RORK Grebe, two step, with
automatic filament control.....\$55.00
No. RORD Grebe Detector and two
step, with filament control..... 75.00
No. 215 General Radio, two step..... 50.00

AUDION CONTROL PANELS
No. RORH Grebe, in cabinet with
tickler connection, splendid panel.\$17.00
No. RORA Grebe, in cabinet with
hinged cover, good value..... 12.50
No. 70 Paragon, moulded type..... 6.00

CONDENSERS (Fixed Mica Type)
No. ROCC Grebe, .0002 MFD.....\$ 1.00
No. ROCD Grebe, .0005 MFD..... 1.20
No. ROCE Grebe, .001 MFD..... 1.60
No. ROCF Grebe, .005 MFD..... 3.80
No. ROCA Grebe, .0002 MF and .5
meg. leak 1.20
No. ROCB Grebe, .0002 MF and .3
meg. leak 1.20

GRID LEAKS
No. MW-1 Radio Corporation, .5,
1, 1.5, 2, 3 and 5 megohms, com-
plete\$ 1.25
Grid leak unit only..... .75
Base only50
No. 21 Chelsea, 10 values, .5 to 5
meg. 3.00

METERS (Weston, D. C. Inst.)
0-100 Milli-amps., flush, japan.....\$ 8.50
0-200 Milli-amps., flush, japan..... 8.50
0-300 Milli-amps., flush, japan..... 8.50
0-500 Milli-amps., flush, japan..... 8.50
0-1, 0-2, 0-3, 0-5, 0-10 amperes, flush,
japan finish 8.50
0-50 volts, flush, japan..... 8.50
0-100 volts, flush, japan..... 13.50
0-500 volts, flush, japan..... 21.25

OMNIGRAPHS
No. 2 Omnigraph, 15 dial machine..\$30.00
No. 2 Jr. Omnigraph, 5 dial machine 22.00
No. 5 Omnigraph, 1 dial machine.. 14.00
Set of 15 dials for No. 2 machine.. 4.00

REGENERATIVE RECEIVERS
No. CR-3 Grebe, 175-680 meters,
"Relay Special"\$65.00
No. CR-3A Grebe, 175-375 meters,
tube control self contained..... 45.50
No. CR-5 Grebe, 150-3000 meters
with tube control, "Super-Spe-
cial" 80.00
No. RA Westinghouse, just out; 175-
700 meters 65.00

"Our Foreign Department is especially qualified for handling orders
from customers in Alaska, Hawaiian Islands, Australia and the Orient."
Send 10 cents for our Catalog. Over 100 pages, over 150 illustrations, over
600 items. Insist upon receiving our copy!

F. D. PITTS CO., Inc.

12 PARK SQUARE

DEPT. E.

BOSTON, MASS., U. S. A.

NEW APPARATUS DEVELOPED

THERE has been much excitement during
the past week in the radio circles of
Portland, Ore., by the completion of the
first Radiotelescopograph to be manufac-
tured by the Northwestern Radio Manufac-
turing Company.

It has proven after many tests to be an
excellent piece of apparatus except for a
few minor points, which will be adjusted in
the future so that everybody will be satis-
fied.

Mr. William Leidigh (7ZB ex 7DS) was ap-
pointed to try out the apparatus at his sta-
tion, and after locating the wave of the
Lyric show house of this city, he stated
that he had a very enjoyable evening.

The local theatrical managers are starting

negotiations with the Paramount Radio Lab-
oratories of Oak Grove, Ore., for the pur-
chase of large amounts of wave filter with
which to line the walls of their theaters.
They stated that the attendance has fallen
off greatly in the past week. Mr. Austin
(7XFr 7ZI), president of the Northwestern
Radio Manufacturing Company, says he has
more orders for this apparatus than he can
fill at the present time.

Mr. J. D. Tait (7JW), president of Covey
Motor Car Company, has placed an order
for one of these sets. He is planning on
demonstrating his cars by sending a car
with a driver out over the hills and showing
the buyers in his office the merits of the
car via Radiotelescopograph. Not Advtd.

AT LAST!

Protection for
Vacuum Tubes

The delicate filaments of any
Vacuum Tube cannot be de-
stroyed by excessive amperage
when protected by

RADECO

SAFETY FUSE

Pat. Pending

Slips directly on filament terminals
of any standard socket without dis-
torting springs or lowering effi-
ciency. RADECO Safety Fuses
positively protect your tubes in
indefinitely.

RADECO Safety Fuses
are equally valuable in all
C. W. work preventing
injury to meters, etc. result-
ing from shorts. Send today
cash, money order or certi-
fied check.

3 For

\$1.00

35c Each

ORDER BY MAIL
In ordering state size wanted

RADIO EQUIPMENT CO.

630 Washington Street
BOSTON, MASS.



Carrying
Capacity

¾, 1, 1½, 1½
2, 2½ and 3
amp. Size ¼
in. over all.

DIRECTIONS

For indefinite protection of your
Tube slip the RADECO Safety
Fuse directly on the filament
terminals.



2000 Volt C. W. Condenser
.001 and .002 Mfd. capacity
New dielectric, copper lugs
75 cents each

Bulletins and Treatise on C. W. and
Radio Phone transmitters 20c

Somerville Radio Lab.
WINTER HILL, 45, MASS.



AMATEURS EVERYWHERE
are reading this national radio
journal.

It is interesting and different.
Each copy is worth the price of
a year's subscription—One Dollar.

Write today for Sample Copy

RADIO TOPICS

4533 N. Sawyer Ave., Chicago, Ill.

BACK TO OLD PRICES



PARKIN RHEOSAT

5000 SOLD LAST YEAR
AT \$1.00

Now reduced to

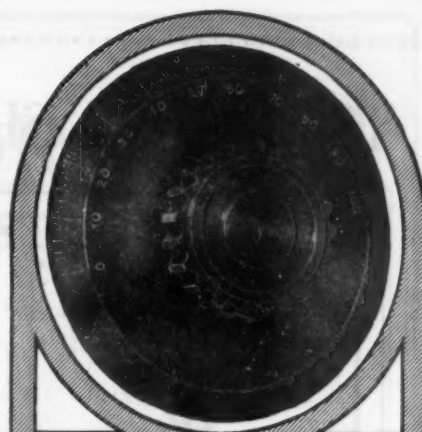
75c

- | | |
|---|----------|
| No. | Postpaid |
| 31. Audion panel with rheostat or B Battery Switch..... | \$8.00 |
| 43. 45-volt large B Battery..... | 5.00 |
| 50. PARKIN .001 mf. variable condenser, unit only..... | 1.50 |
| 51. PARKIN .001 mf. V.C. with knob and pointer..... | 2.00 |
| 52. PARKIN .001 mf. V.C. with knob and 3 in. dial..... | 2.50 |
| 53. PARKIN molded bakelite fixed condenser | 0.70 |
| U. V. 200 Radiotron Vacuum tube.. | 5.00 |

DEALERS—If you are not on our mailing list write for new catalog and discounts

PARKIN MANUFACTURING CO.
San Rafael, Cal.

**DON'T FORGET TO
READ THE
CLASSIFIED
ADVERTISEMENTS**



CORWIN DIALS

If it were not for the outstanding quality of Corwin Dials, we would emphasize the price more. But we think you will agree that their accuracy and dependable performance is of more importance than the reasonable price.

3" Dial, 75c—with knob, \$1.30

3 1/2" Dial, \$1.00—with knob, \$1.70

At all Radisco agencies,
and other reliable dealers,
or send postpaid anywhere

A. H. CORWIN & CO.
4 West Park St., Newark, N. J.

FORMICA

SHEETS - TUBES - RODS

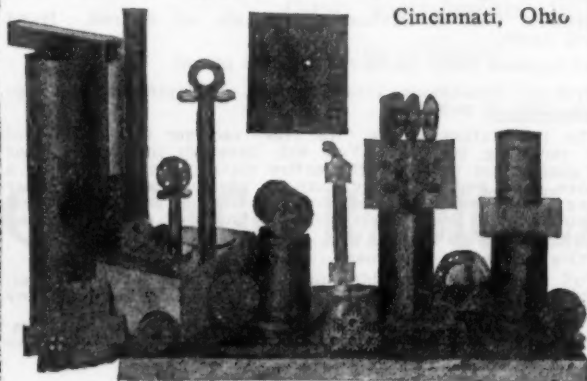
Made from Anhydrous Redmanol Resins

Formica is a homogeneous waterproof insulation with exceptionally high dielectric properties. It is readily machined and does not warp or shrink.

Formica is the ideal material for panels and other insulation parts of Radio Apparatus, on account of its superior electrical and mechanical properties, as well as its splendid appearance.

THE FORMICA INSULATION CO.

Cincinnati, Ohio



Pacific Coast Representatives:
Hermans-Griffith Co., Sheldon Bldg., San Francisco
Jobbers: Leo J. Meyberg Co., 428 Market St., San Francisco; Wireless Shop, 511 W. Washington St., Los Angeles; Northwest Radio Service Co. Seattle, Washington.

The SORSINC "B" BATTERY

"THE LARGEST "B"—KNOWN

By getting away from the usual pencil-like cell construction and using a cell of suitably larger dimensions, constructed of specially selected materials and ruggedly grouped, we are producing a dependable battery that will give long life.

Ship Owners Radio Service, Inc.

80 Washington St.

New York City

If your dealer cannot supply you,
order direct from our nearest
office.

PRICE \$4.00 F.O.B. N. Y.

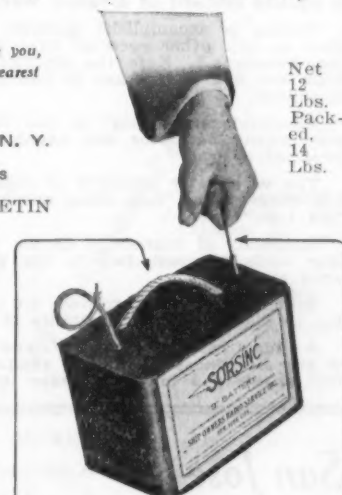
Or Branch Offices

WRITE FOR BULLETIN

Branch Offices:

Boston
Philadelphia
Baltimore
Norfolk
Savannah
New Orleans
Galveston
San Pedro
San Francisco
Portland, Ore.
Seattle
Honolulu
London

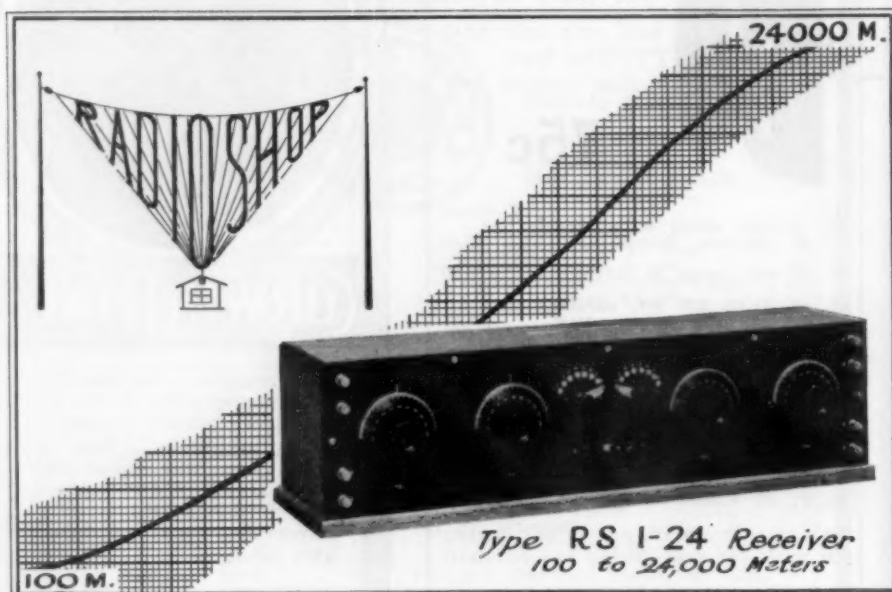
Dealers: Write for our
Proposition



Net
12
Lbs.
Pack-
ed,
14
Lbs.

RUGGED CONSTRUCTION

The RADIO SHOP type "RS 1-24" RECEIVER



An original application of regenerative tuning to a receiver that covers, with the utmost efficiency, every wavelength in use today

The secret of the complete success of the "RS 1-24" receiver lies in the fact that it is not a single device covering all wavelengths but three distinct and separate combinations, all employing the unquestionably superior regenerative method of tuning.

Heretofore all multi-wavelength receivers have consisted of one form of a tuner which was usually "loaded" to reach the higher wavelengths. This method has never given complete success as the "dead end" and other self-evident losses have always decreased the efficiency on the short end of the scale, no matter what precautions, such as "dead ending" switches, have been taken to counteract it. Also it is a well known fact that the very short wavelengths require an entirely different form of tuning than can be successfully applied to the longer waves. Hence the inefficiency of "loaded" short wave receivers.

In the "RS 1-24" these faults are entirely overcome and "dead end" losses eliminated by using three separate arrangements of tuning for the three main groups of wavelengths in use today, namely—Amateur, Commercial ships and marine land stations, and the high power arc and spark transoceanic stations. These changes are made instantly in the "RS 1-24" by a three circuit "master" switch, making it possible to "step up" from amateur wavelengths to the high power arcs and sparks, and vice versa. This method permits the most highly efficient method of tuning to be applied to each individual wavelength group.

A FEW PERTINENT FACTS ABOUT THE "RS 1-24" RECEIVER:

There is absolutely no sacrifice of efficiency on any of the wavelengths covered.

The RADIO SHOP Short Wave Receiver is the most highly efficient short wave receiver on the market. The "RS 1-24" is equally efficient on amateur wavelengths, if not more so.

Tuning is accomplished quicker, and in a cleaner manner, than in any other receiver ever built. There are no faulty "combinations." Note the simplicity of controls. Only three dials and one switch are in use on any of the three groups of tuning.

Absolutely no "holes" in the tuning range. A consistent and mighty oscillator and capable of instant non-oscillation when so desired.

The variometer principle of regeneration applied to the entire range. This fact alone speaks for the efficiency of the "RS 1-24."

Simplicity of connection to the vacuum tube control. Only four leads required, two to the grid input and two to the plate circuit.

Same vacuum tube suffices for long as well as short waves due to the remarkable flexibility of oscillation control.

An ideal receiver for C. W. and telephone work on account of the broadness of tuning available on the "stan-bi" side. Will enable you to "find" those sharp tuning tube sets.

The elimination of all plugging in and out of coils. Absolutely no other accessories required except the vacuum tube and its attendant controls.

Will enable you to hear commercial ship and marine land stations that were heretofore unheard. The 600-meter section is equally efficient as the short and long ranges.

Has a "stan-bi" position that will enable you to "find" stations that you missed entirely before.

No element of "luck" necessary for the successful operation of the "RS 1-24." It is a positive receiver designed by practical radio engineers who knew what was wanted.

Interior construction that is right, and in keeping with the exterior appearance. No Seals. We want you to know your set.

Produced and sold at the lowest possible price consistent with the best of materials and a fair profit, by systematic workmanship.

Last but by no means least, licensed under Major Armstrong's regenerative patents and applying his unapproachable circuit to its utmost effectiveness.

MECHANICAL AND CONSTRUCTIONAL POINTS OF SUPERIORITY:

Grained and engraved Bakelite panel and dials. The latter of ample size and with an easily manipulated knob.

Genuine hand wound bank windings in connection with special form concentrated inductances that utilize every iota of the incoming energy.

Heavy "bus bar" wiring of hard bare copper reducing resistance to the minimum and insuring permanence.

Balanced type variable condensers constructed especially for the "RS 1-24." As non-shorting as a condenser can be made.

Full bearing switches that run smooth and give perfect contact.

Genuine Oak or Mahogany cabinets as desired. Hand rubbed finish.

All exposed metal parts satin nickel plated.

Over-all dimensions 7x7x25 inches. Shipping weight approximately 30 pounds.

The installation of the "RS 1-24" receiver will end all of your receiving troubles. You will have an instrument that will enable you to cover the entire wavelength range with a greater ease and efficiency than is possible with any other tuning arrangement you can buy or build. It will be the best investment you ever made from a financial as well as an efficiency standpoint.

Price, F. O. B. San Jose.....\$100.00

Full instructions and blue prints accompany each receiver. In ordering be sure and specify whether oak or mahogany case is desired.

San Jose

The RADIO SHOP

California

When Writing to Advertisers Please Mention this Magazine

HERE'S \$5.00 FOR YOU!

AN OFFER WITHOUT ANY STRINGS

In order to start things going with a bang this fall we will credit \$5.00 on every order for one of our Z-Nith Regenerators or Amplifigons, Type AG-N-2, when such orders are sent in direct to us, *accompanied by the attached coupon*. Only one of each of these incomparable instruments sold to any individual on this offer.

The new type Z-Nith Regenerator equipped with long wave attachment with maximum of 1,000 meters and 180 degree coupling adjustment. The best regenerative receiver on the market today for spark, CW or radiophone reception.



Z-Nith Regenerator

Regular price \$55.00, with coupon \$50.00



Z-Nith Amplifigon Type AG N-2

Regular price \$89.25, with coupon \$84.25

The new type Amplifigon Detector-Amplifier Type AGN-2, equipped with special high voltage cut-off switch, non-squealing amplifying transformers, variable grid condenser and plate potentiometer. Ideal for use with any tuner or regenerative receiver on the market.

THIS OFFER GOOD ONLY DURING MONTH OF AUGUST

Write now for Bulletin F-21 describing these instruments and take advantage of this opportunity.

CHICAGO RADIO LABORATORY

6433 Ravenswood Ave.

CHICAGO, ILL.

C. R. L.
6433 Ravenswood
Ave.,
Chicago, Ill.

Gentlemen:

In accordance with
your wonderful
August offer enclosed

find \$.....
for which send me

one.....

NAME.....

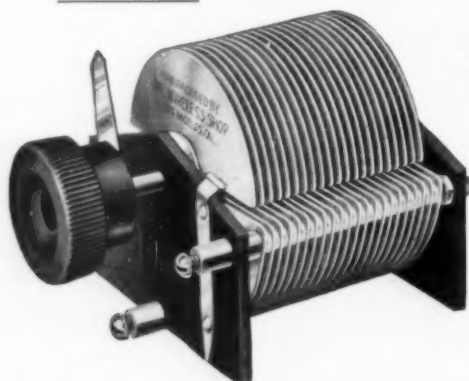
ADDRESS.....

TOWN.....

When Writing to Advertisers Please Mention this Magazine

QUALITY OR PRICE?

Which are You interested in?



SERIES "T"

WOULD YOU RATHER TAKE AN INFERIOR INSTRUMENT AND SAVE A FEW CENTS—OR—PAY A LITTLE MORE AND GET THE BEST?

IF YOU WANT THE **BEST**—BE SURE AND SAY—

"WIRELESS SHOP PRODUCTS"

"WIRELESS SHOP" VARIABLE CONDENSERS are now recognized as the standard. Why are they so POPULAR? There's a reason—

BEST of material and workmanship—

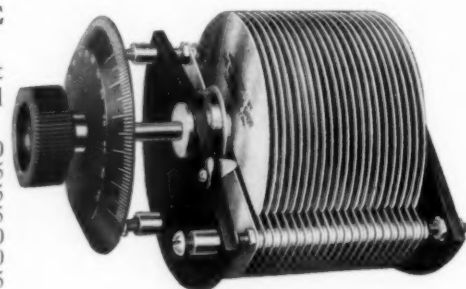
Careful inspection, and NO COMEBACKS. ISN'T THAT WORTH SOMETHING?

THE "WIRELESS SHOP" LINE INCLUDES EVERY TYPE OF RECEIVING INSTRUMENT

Our "Series T" variable condenser is the IDEAL instrument for your receiving set. Supplied with knob and pointer and mounting screws, either brass or nickel, at the following prices:

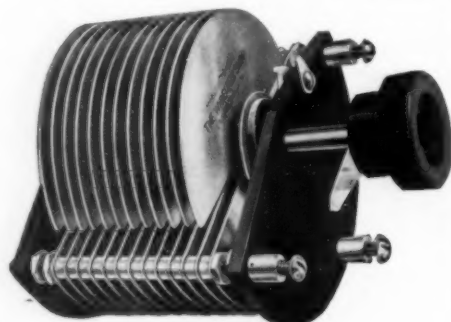
No. 20	2 plate Vernier Condenser.....	\$2.00
No. 70	7 plate, approximately .0001 m. f. maximum capacity.....	2.35
No. 130	13 plate, approximately .0002 m. f. maximum capacity.....	2.75
No. 170	17 plate, approximately .0003 m. f. maximum capacity.....	3.15
No. 230	23 plate, approximately .0005 m. f. maximum capacity.....	3.60
No. 310	31 plate, approximately .0007 m. f. maximum capacity.....	4.30
No. 430	43 plate, approximately .001 m. f. maximum capacity.....	5.25
No. 630	63 plate, approximately .0015 m. f. maximum capacity.....	7.50

Include postage for one pound to your postal zone, and insurance.



SERIES "L"

IF YOU REQUIRE A HEAVIER MODEL THAN THE "SERIES T"—OUR "SERIES L" WILL FILL THE BILL. Larger plates and heavier construction throughout. Supplied with knob and pointer and mounting screws, brass or nickel.



SERIES "CW"

PRICES

No. 2300	23 plate, approximately .00075 m. f. maximum capacity....	\$ 6.00
No. 4300	43 plate, approximately .0013 m. f. maximum capacity....	8.00
No. 6300	63 plate, approximately .002 m. f. maximum capacity....	10.00

Include postage for two pounds on No. 2300 condenser and for three pounds on No. 4300 and No. 6300, and insurance, to your postal zone.

AND—OUR SERIES "CW" IS THE **ONLY** REAL CONDENSER FOR YOUR PHONE OR "CW" SET.

The plates are amply spaced to prevent spark-over on high plate potentials, and the construction is extremely rigid. With knob and pointer and mounting screws, the prices are:

SERIES "CW"

No. 1500	15 plate, approximately .0004 m. f. maximum capacity.....	\$6.00
No. 2500	25 plate, approximately .0006 m. f. maximum capacity.....	7.50
No. 3500	35 plate, approximately .0008 m. f. maximum capacity.....	9.00

Include postage for two pounds on No. 1500 condenser, and for three pounds on No. 2500 and 3500, and insurance, to your postal zone.

IMPORTANT ANNOUNCEMENT—Watch our add next month announcing our new **VERNIER**, which may be attached to any standard "Wireless Shop" Variable. And the price is so low it will surprise you. See it next month.



511 WEST WASHINGTON STREET

LOS ANGELES, CAL.

When writing to Advertisers please mention this Magazine

PARAGON R.A. TEN

Protection Against Regrets Absolutely Guaranteed by Originator's Name



*Licensed under original
Marconi & Armstrong patents*

SEALS BROKEN *by popular request!*

NO MORE seals on PARAGON R.A. TEN receivers,—take the panel off before you buy,—see for yourself the splendid workmanship behind the handsome cabinet,—and you will better understand the reasons for PARAGON's unequalled selectivity and amplification.

Ask your radio dealer to show you the inside construction of a Paragon. If he hasn't one in stock he will gladly get it for you.

Endorsed by prominent amateurs everywhere

SCORES of letters on file at our offices from enthusiastic amateurs, testify to PARAGON's marvellous results. The latest one as we go to press is from J. O. Smith of Valley Stream, L. I. He says, "The PARAGON R.A. TEN receiving set which has been in use at 2ZL station for the past two months has proved to be entirely satisfactory in every way, and has done everything you claimed it would do. It is remarkably efficient and selective on all wavelengths. The R.A. TEN has proved to be especially satisfactory in C.W. work, because of the complete absence of capacity effects."

OTHER amateurs have "heard stations they never heard before." A Y. M. C. A. radio school tested PARAGON in direct comparison with other leading makes, and reported that "PARAGON fulfilled every advertised superiority." Such endorsement is ample evidence that PARAGON R.A. TEN is well worth its \$85.00 price.

Satisfactory performance absolutely guaranteed

THE CONTINENTAL Radio and Electric Corporation accepts full responsibility for the satisfactory performance of PARAGON R.A. TEN receivers, as long as the internal construction remains unchanged. We cannot, of course, continue to be responsible if the design or wiring has been tampered with. In actual practice, however, the results are so surprisingly pleasing that few have any desire to make any alterations. In any case, Continental will see that you get a square deal and your money's worth.

Special opportunity to radio clubs

IF YOU are an officer or member of a radio club, you will be interested in this special offer. For a short time only, radio clubs in good standing will have the opportunity of securing a genuine PARAGON R.A. TEN regenerative receiver for their club house—**absolutely FREE**. Have your President or Secretary write on the club's letterhead for particulars at once.

Descriptive folders on PARAGON R. A. TEN and PHONETRON, the improved type of loud speaker, sent free on request. Or send 25 cents for the GRECO catalogue,—listing all the worth while equipment in use today.

CONTINENTAL RADIO and ELECTRIC CORP.

EXCLUSIVE WHOLESALE DISTRIBUTORS FOR PARAGON R.A. TEN AND PHONETRON

J. DiBlasi,
Sec.

Dept. G77 6 Warren Street New York City

J. Stantley,
Treas.

RADISCO BETTER "B" BATTERIES

are an investment in satisfaction! To pay less is to sacrifice essential elements of quality. To pay more is unnecessary—a needless use of money which might better be put into other apparatus.

Operating life. - 600 to 1000 hours
15 cells. - 22½ volts
No. 1 (3½ x 2 x 2½ in.) - \$1.50
Shipping weight 8 pounds
No. 2 (6½ x 4 x 3 in.) - \$2.65
Shipping weight 8 pounds.

Larger size has variable voltage feature. Tapped in groups of three cells. Ask your dealer to explain it.

For radio phone work, Radisco Better "B" Batteries provide a reliable source of power, without the disagreeable hum of a motor generator or the rectified 60 cycle tone.

Radio Distributing Co.
Newark New Jersey



This Mark



Your Guarantee

No batteries at the price are as good.

No batteries at any price are better.



THE RADIO DEALERS listed below are progressive merchants. They are equipped to give you helpful advice and real service in selecting your radio equipment. As an indication of their up-to-date methods, they carry a complete line of Radisco apparatus, including the new vario-coupler, Radisco Coils, Better "B" Batteries, Corwin Dials, etc. Buy from the nearest Radisco agency, and be sure of satisfaction.

ALBANY, N. Y.
Shotton Radio Mfg. Co.
8 Market St.

ASHEVILLE, N. C.
Hi-Grade Wireless Instrument Co.

ATLANTIC CITY, N. J.
Paramount Radio Supply
Arkansas & Pacific Aves.

BOSTON, MASS.
Atlantic Radio Co.
88 Broad Street.
BROOKLYN, N. Y.
Kelly & Phillips,
312 Flatbush Avenue.
CHICAGO, ILL.
Chicago Radio Labs.,
1316 Carmen Ave.
Branch, Peoria, Ill.
EUREKA, ILL.
Klaus Radio Co.
KANSAS CITY, MO.
McCreary Radio Supply
4th and Delaware Sts.
McKEESPORT, PA.
K. & L. Electric Co.
427 Olive Street.
NEWARK, N. J.
A. H. Corwin & Co.,
4 West Park St.
NEW BRUNSWICK, N. J.
Geo. N. DeLaplaine,
306 George St.
8th and Magnolia Sts.

NEW ORLEANS, LA.
Rose Radio Supply,
604 Gravier St.
OMAHA, NEB.
O. B. Radio Supply Co.,
406 Brown Building.
PHILADELPHIA, PA.
Philadelphia School of
Wireless Telegraphy,
1533 Pine St.,
PLAINFIELD, N. J.
Paul R. Collier,
154 E. Front Street.
PITTSBURGH, PA.
Radio Electric Co.,
3807 Fifth Ave.
PORTLAND, ME.
Atlantic Radio Co.,
15 Temple St.
PROVIDENCE, R. I.
Rhode Island Elec.
Equip. Co.,
45 Washington St.

SEATTLE, WASH.
Northwest Radio Service
609 Fourth Ave.
SCRANTON, PA.
Shotton Radio Mfg. Co.
P. O. Box 3.
Branch, 8 Kingsbury St.
Jamestown, N. Y.
WASHINGTON, D. C.
Eastern Radio and Elec-
tric Co., 1405 Florida
Ave., N. W.

Canadian

MONTREAL, QUEBEC
J. B. Miller,
136 Vendome Ave., N.D.G.
TORONTO, ONTARIO
The Vimy Supply Co.,
567 College Street.

To Responsible Dealers:
If you are in a town where
there is no Radisco Agency,
you will benefit by writing
for the Radisco plan.

RADIO DISTRIBUTING CO., Newark, N. J.

RADISCO

"Your Assurance of Satisfactory Performance"